Centre for
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Queen's University
Kingston, Ontario

Marketing of Nonferrous Metals

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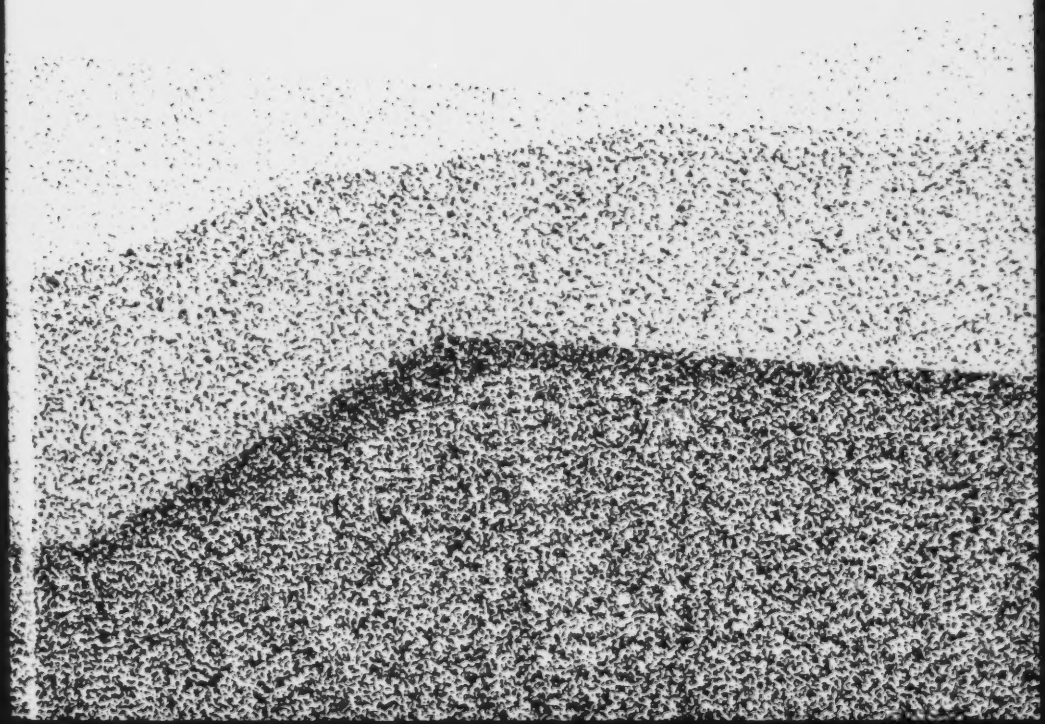
Edited by
L. Moira Jackson
Peter R. Richardson



MARKETING OF NONFERROUS METALS

Proceedings of the
Nineteenth CRS Policy Discussion Seminar

November 21-23, 1988
Kingston, Ontario

Edited by

L. Moira Jackson
Peter R. Richardson

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FOREWORD

This volume contains the proceedings of the 19th CRS Policy Discussion Seminar. The CRS seminar series brings together individuals from industry, governments, labour, universities, and other organizations to share their knowledge and views on selected issues in mineral policy.

The seminar was held at the Donald Gordon Centre for Continuing Education in Kingston on November 21-23, 1988. The program was arranged by Peter Richardson of Queen's University School of Business, in consultation with CRS. The proceedings volume was edited by Moira Jackson and Peter Richardson and produced by Donna Stover.

The Centre is grateful for the contributions of the speakers and participants, both during the seminar and in the preparation of the proceedings. Views expressed are those of individual participants, and do not necessarily represent the views of the Centre or its sponsors.

Margot J. Wojciechowski
Centre for Resource Studies

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INTRODUCTION

Moira Jackson

Among the many challenges facing metal producers are the development of substitutes such as plastics and ceramics, health and environmental concerns, shifting markets, expanding production from third-world competitors, and worldwide political and economic instability. Firms in the metals industry have traditionally been price-takers, regarding their proper business to be that of extracting the ore and selling it for whatever price it would bring. Even those companies which have integrated vertically to avoid the extreme cyclicality of demand and price for their primary product have seemed unaware that they should be distinguishing between "sales" and "marketing".

Speakers at the seminar addressed a range of topics related to marketing: metal-pricing mechanisms, emerging patterns in mineral trading, the nonferrous-mineral industry in China, product and market development, and the role of trade associations in the marketing of minerals.

The consensus was that much of the industry has failed to adapt to changing world markets. Instead of recognizing that traditional markets are far from secure, producers continue to think in terms of selling primary product in as great a quantity as possible, regardless of the prevailing price. Responsibility for this failure to reorient business strategy was attributed to top management's "sales" mentality, which directs their efforts towards taking market share from other producers and closes their minds to the notion of expanding the market. Product and market development were generally regarded as the most effective method of protecting nonferrous metals against the encroachment of substitutes and extending their life cycles.

Participants agreed that resistance by top management to changes in their business strategy might be overcome if they were to hear the seminar's messages from other sources than those within their own companies. As well, it was felt that the most important people to influence are those at the second and third levels of management. A proposal for a follow-up seminar to include these individuals was strongly endorsed.

A CUSTOMER PERSPECTIVE

Richard J. Bauer

I have been asked to comment on a customer perspective of marketing within the metal industry and to suggest possible future strategies to answer the challenge the mineral industry faces from competitive products and materials. I will address these issues by describing the growth of Eastern Alloys and by using Eastern as a case study in marketing strategies.

As an alloyer, Eastern is a large consumer of zinc; however, our product, zinc alloy, is often considered as a raw material by our casting and steel-industry customers. We also interface directly with many medium- and large-sized original equipment manufacturers concerning their future product needs. Eastern is, therefore, both consumer and supplier of raw materials with a unique perspective into end-user requirements across a wide spectrum of consuming industries.

Let me first give you some background.

Eastern manufactures zinc alloys which are sold mainly to the zinc die-casting industry which in turn casts products which typically become hidden within an automobile, appliance, computer, or some other consumer or industrial product. We purchase raw zinc on the world market and alloy it with other commodities to make compositions to industry specification and to standard ingot shapes. Zinc alloys are mature products. Most compositions were developed and initially marketed during the 1920s and 1930s and on into the 1940s.

From modest beginnings in 1965, Eastern Alloys has grown to be a leading zinc alloyer in North America. Although we did not know it at the time, our start-up coincided with the peaking of North American consumption of zinc alloy for casting. Our growth therefore occurred in a declining overall market for zinc die-casting alloy.

Eastern grew by capturing a larger share of the existing market. It was done through "sales development strategies" by providing faster, on-time delivery, higher consistent quality, better technical assistance and services which helped customers save money. We hired technically competent sales people, who out-serviced and out-sold our competitors - not on price, but on the value added to customer services we provided. It helped that our competition was complacent, lacked creativity and did not effectively respond to our marketing initiatives.

However, winning market share from other companies has its limits. By the mid-1970s, shrinking zinc-casting markets were pronounced, particularly within the automotive industry. A shift from decorative to functional forms,

downsizing, lighter and more cost-competitive plastics devastated zinc auto-casting markets. Other zinc markets were also affected. Zinc castings needed to be more cost- and quality-competitive. In addition, new zinc markets needed to be created to maintain growth. Eastern saw opportunities in two major areas:

1. The first was new zinc die-casting technology to make thinner castings at higher quality levels and lower cost.

2. The second was new zinc alloys for "gravity" casting where zinc had never before been applied. The alloys would allow zinc to compete as alternatives to cast iron, bronze and aluminum, using sand and permanent-mold casting technology.

Commencing in the late 1970s, Eastern Alloys incorporated a survival strategy which focused on these two perceived market opportunities. Let me first talk about the new die-casting technology and the transfer of that technology to the marketplace.

Zinc industry research identified new die design principles which dramatically improved the zinc die-casting process. However, the new die technology was linked to accurate process control which could only be determined by instrumentating casting machines. Monitoring of machine shot end performance was a necessary first step to plot a machine performance curve from which the proper utilization of die-casting dies was possible. The entire subject was highly technical and controversial. Die casters were skeptical of this "high tech" approach.

Eastern invested in the necessary instrumentation package and engineering personnel to coordinate our technology transfer effort. By working one-on-one with die casters on their shop floor, quality and cost-saving benefits were demonstrated. The technology allowed zinc to maintain competitiveness and pushed die casting into higher-quality and tighter-tolerance products. Although dozens of our customers now benefit from the new technology, most of the industry does not. A continuous, industry-wide program is necessary to train new people and to update those already applying the technology.

The introduction of new alloys for gravity casting to create new markets is another story. This represented a true market-development effort. Let me digress somewhat to talk about market development, what market development is and who should do it.

Each of our companies has strategies to maintain existing markets and increase our sales. But what we are trying to accomplish is to increase our individual share of an existing market. These are actually sales strategies. Market development, on the other hand, deals with the creation of new ap-

plications to expand the total market. It requires totally different talents, tools and creativity to get the job done.

Firstly, market development people must be technically competent, not only about their product, but about competitive products and processes and their cost to be able to identify potential applications. Secondly, these specialists need to be able to communicate concepts and ideas through creative net shape value analysis. Thirdly, they need to champion the new product concept through prototyping, field testing, redesign, and subsequent approval for production. Finally, they need to babysit the product through the initial production and manufacturing glitches which could occur in machining, plating, finishing, and any other secondary operation. This process takes time - months and often years. As you can see, creating new markets and applications is a time-intensive, long-term commitment which does not fit the normal short-term sales or market share mentality.

Since the goals and time frame to gauge the success of market creation are completely different than for sales, market development at Eastern was identified and functioned as a separate entity, reporting directly to top management. Direct return on investment (ROI) was, and still is, difficult to measure in the usual cost/benefit evaluation. During the first several years of our market development effort, growth of the new alloy was modest. However, with the recent application of the new alloys for pressure die casting, which is a high-volume manufacturing process, growth has escalated.

In addition, a sizable niche market for the alloys as bearing material was identified and, also, a new casting process evolved which uses zinc exclusively.

After 12 years of market development and technology transfer experience, what advice can I give you regarding the marketing task facing the mineral industry? Certainly we must look at the bottom line and focus on the financial responsibilities to our stockholders. Technology transfer and market development are, however, long-term investments with little short-term return. They need to be championed and nurtured by top management if they are to succeed. However, without them we seriously negate our obligations to the future survival of our industry and our individual enterprises.

With few exceptions, the metals industry remains production-driven, concentrating on developing new resources and processing to produce more copper, zinc, lead, nickel, etc. at lower cost. This must change to a market-driven philosophy by satisfying product application demand from material-specifier decision-makers. The real minerals customer is not necessarily the person you sell to. The real customer is most likely your customer's customer who specifies a product or component. For this reason, we need to know what is going on in terms of these competitive forces and substitution materials and processes our fabricator customers are facing, which are a direct reflection of designer/specifier needs.

We need to make sure that the designers of products are aware of our respective materials, their properties and manufacturing capabilities, so that he can knowledgeably consider and apply our products.

Recently, a senior Ford executive expressed the idea that the future growth of zinc in automobiles will come from castings and not necessarily just coatings. Zinc coatings have enjoyed considerable growth within the automotive industry as corrosion protection for steel. If he is correct, then we in the zinc-casting industry need to find out what these potential new applications are and work with the design groups to make sure that they happen.

Please bear in mind that Ford has out-sourced much of its manufacturing and relies upon its suppliers, not just for components, but for complete sub--assemblies. Furthermore, the design and material selection of sub-assemblies are left in large part to these Tier 1 sources. Ford does not necessarily care what materials are used, provided these sub-assemblies are cost-effective and meet their style and function standards. Herein lies an example of the mineral industry's future marketing challenge.

How do we find, interface and influence material decision-makers with future design considerations? What additional products can be developed to satisfy designer needs and the creation of new markets? How and by whom will these new products be effectively introduced and marketed?

I believe these responsibilities are best handled by market-development specialists who work closely with your sales force but who have the specific task of protecting and expanding existing product markets as well as introducing new technology and new metal products to create new markets. Their focus is the marketplace dealing with manufacturing technology and product specification. Here are a few concepts and strategies which Eastern's market-development team has employed and which we believe have value for the metals industry in general.

- Develop a perpetual education program aimed at designers/material-specifiers to raise product application awareness. These programs can include

  - application-design seminars;
  - direct-mail promotion to specifiers;
  - news stories in technical and design journals;
  - presentations at industry meetings;
  - paid advertisements.

- Develop programs to educate your customers to become more effective marketers of your mineral products. Cooperative efforts to consider are

  - joint technical presentations to end users;

  - helpful technical literature which customers can use to promote your products;
  - technical and design help for application products.

- Champion niche-market opportunities, such as a special finish, or manufacturing technology which gives your material a competitive edge and helps promote the technology.

- Look for non-equity partnerships with a single or a group of companies to do mutually beneficial research, promotion or market development - or to provide input and direction for R & D.

- Support and promote the adoption of new process technology for customer fabricators which ultimately makes your product more cost-competitive or technically attractive to designers and specifiers.

- Establish communication with leading industry design groups, such as automotive, computer, appliance, and so forth. These groups are often at the forefront of new material application. Promote in-house seminars; identify potential new applications; and help make applications happen.

- Search for potential applications in product standards, such as Underwriters Laboratory, Canadian Standards Association, and the National Electric Code through investments in comparative testing and evaluations.

- Develop and promote a technical hotline for designers to discuss possible applications or to answer technical questions supported with appropriate technical literature. Be prepared to review drawings and advise on design and how to locate quality vendors.

- Develop a list of quality vendor customers with whom you can work, to quote and make applications, and who can assist with design. Make them part of your design/marketing team.

- Actively support and participate in industry organizations. Make them effective; otherwise, they can become costly and self-serving.

Gentlemen, mineral producers can no longer remain commodity sellers. Your focus should be on creating markets. That can only be accomplished by being proactive in new-product development and through an aggressive design education program which continuously tells material specifiers the story we want them to hear. If we remain complacent, there is no doubt that competi-

tive technology and material substitution will erode our markets. The need for new lines and expanded mineral processing becomes very questionable.

Top management clearly has the responsibility to dedicate both people and resources to protect what we have and generate new products for our materials: a market- development strategy which focuses on the "new" and what "might be" instead of the "past" and what "was". A proactive strategy which will make us more knowledgeable about end-use product needs, manufacturing and market intelligence to direct our R & D and how best to position our products in the years to come.

One final thought for our consideration: the minerals industry serves a global market, and market researchers point out that underdeveloped Third-World countries represent untapped growing potential for our products. However, their needs are very simple - basic agricultural tools, can openers, electric toasters, simple modular housing and basic systems for heating and cooking. High-tech computers and sophisticated stereo systems aren't worth much compared to a better-functioning charcoal stove.

I often think we in North America should reinvent products which our pioneering forefathers used in their homes, farms, and industries. The point is, these are huge markets for metals in low-tech products which we in the minerals industry need to identify and help manufacture and market to Third-World countries.

The task of working with governments and world support organizations to identify needed products and develop manufacturing partnerships is, I believe, an opportunity to secure new markets for the metals industry.

So, there are two sides to our marketing challenge. We must continue to support and market our products through designers and specifiers who are responsible for creating better, high-technology products at lower cost through advanced manufacturing methods. At the same time, we should look for opportunities to introduce our metals into simple, practical products that billions of people in underdeveloped countries will be wanting and needing.

These are formidable challenges and yet represent great opportunities to expand our markets and secure our future. Let's not overlook the fact that the concepts presented address the responsibilities we have to our stockholders to survive into the future and our social obligation to make our community and the world a better place to live. This can only be accomplished and made possible by the end-product user, the consumer, seeing continuous competitive value in purchasing your mineral industry products.

CANADA-CHINA MINERAL TRADE

Lorraine Spiess

After a brief discussion of China's expansion plans and the upcoming five-year plan, I will move on to a survey of the relevant commodities, on an individual basis, and comment on the implications for Canadian trade with China.

In recent years the nonferrous industry in China has been rather underdeveloped, in part because until 1983 the nonferrous sector fell under the jurisdiction of the Ministry of Metallurgical Industry (Minmetals), which is responsible for the ferrous development, and China put most of its emphasis into developing the entire steel industry with very little attention left over for nonferrous. Consequently, in the latest five-year plan, an increased emphasis was put on the nonferrous sector so that, according to the plan, by 1990 the output of the ten major metals is to increase by an average of 44.7 percent above 1985 levels. This breaks down in the following way: 90.6 percent for aluminum, 31.4 percent for lead and zinc, and 12.5 percent for copper. It is expected that growth *will* come within the range of these targets.

Although China has ambitious plans to expand this production capability, it does have a population of over a billion; GNP growth in recent years has been averaging in the range of 12 percent; and the country has been isolated from most of the rest of the world for the last 30 years. Consequently, I see as unfounded the concerns that many western companies have that the growing development of the nonferrous sector in China will impact upon the export markets. In fact, it is expected that by the year 2000 consumption of nonferrous metals will more than double and that the shortfall between consumption and production will continue. Just to give you an idea of how important the nonferrous market in China is to Canadian industry, in 1986 Canadian exports of all metals and minerals to China totalled $134 million, which is significant but substantially less than the levels in 1985, when Canada exported $440 million of minerals and metals. I think that Canada has significant potential for expanding commodity trade with China.

Aluminum

Aluminum is the key priority for China's nonferrous expansion. The reason for this emphasis on aluminum is that, after steel, aluminum remains the single largest drain on China's scarce foreign exchange reserves. In 1985, for example, China spent US$742 million on aluminum imports, about ten percent of which came from Canada. In China's aluminum expansion plan, probably

over a dozen greenfield projects have been shopped around internationally and presented at various fairs. It is certainly unlikely that all of these projects will go forward. On the other hand, they are not to be dismissed and I would estimate that a substantial percentage of those projects will eventually be implemented. Most of the projects under discussion are in the range of around 100,000 metric tons. But China also increased bookings to develop some large complex centres for the aluminum industry. Probably the largest aluminum project right now, one that is certainly going to be realized is the Great Wall project, in Hunan province. That will have a capacity of 500,000 metric tons and is expected to come onstream during the mid-1990s.

So we are looking at a situation where China presently produces in the range of 600,000 tons of aluminum, but it is expected that by the turn of the century China will be producing in the range of 2 million tons. China has a stated goal that by the end of the century it will become a net exporter of aluminum. In the course of doing my study I did some extensive projections based on consumption, and it's really almost impossible that China will reach this stated goal. In fact, even if China could keep its growth of consumption in the range of seven percent, which would be a one-to-one ratio with GNP growth and a very minimal GNP growth - much less than recent years - it would still only be reaching self-sufficiency by continuing its present trend. Consequently, it is my opinion that China will remain a major net importer of aluminum in spite of this expansion and that quantity will be in the range of 200,000 tons.

China has developed a very clear strategy to maintain self-sufficiency or even develop exports in ores and semis, and it has biased its imports towards highly processed product. Of course, this is a very smart strategy because, on the one hand, it decreases their dependence upon specific suppliers while, on the other hand, it ties in their end-users very closely to their bauxite and to their manufactured products. (While it is not of direct interest to Canadian industry, it is expected that China's fairly substantial bauxite exports will be decreasing as China develops its own alumina production and also that it will continue to be a very significant net importer of alumina, sourcing primarily from Australia, Venezuela and other main producers.)

Because of the financing obligations, particularly in the downstream manufacturing sector, it is expected that even if China were to achieve self-sufficiency, China would also be exporting and importing concurrently. This is something that many people find very confusing and problematic, and it is not going to go away, unfortunately. In order to finance the manufacturing expansions, for example, in Bohai - which is actually one of the largest projects in China right now, a manufacturing expansion in the order of 200,000 to 300,000 tons - substantial countertrade obligations will be incurred to export downstream products. In fact, there has also been talk that China will be entering countertrade agreements, particularly with Japanese trading houses.

I know that Mitsui has been very actively pursuing the possibility of countertrade financing with some of the large smelter complexes in central China in order to secure long-term supplies of aluminum in China. In the very long term, it is clear that China is looking towards becoming a net supplier of aluminum for Japan and that the Japanese are also keeping very close tabs on what is happening in the aluminum industry.

Copper

The development of China's copper industry ranks far below the priority accorded to aluminum, zinc and lead, as well as other nonferrous metals such as tungsten and tin which can be exported for foreign exchange. In fact, the current five-year plan calls for a increase of merely 12 percent. China is the 10th largest copper-producing country in the world but it is already the 6th largest consumer. As no major expansion of capacity is planned, and as consumption will grow in the next decade, China will continue to be a major importer of copper well beyond the year 2000. With regard to quantities of copper concentrate, I estimate 200,000 tons for the near future, and it could increase substantially beyond that by the turn of the century.

Smelting and mining capacity are considerably in excess of mining capacity, but Chinese buyers have decided against developing new copper mines as the mine production costs in China are considerably above international prices. This is due to the facts that, first, China has very low grades of ore deposits and, second, many major ore deposits are located in very difficult places. For example, one of the largest copper deposits in China is located in Tibet, which is not very economical to develop.

It is expected that, in the future, China will remain a very large importer of concentrate and will be securing its costs both on international markets and also by investing abroad. This is something Canadian industries certainly should keep in mind. The Chinese have been talking to various countries over the years about the possibility of investing in copper. They have abandoned the Philippines and South America for various political reasons. Right now the key countries they are talking to quite seriously are Zambia and Australia but, according to a lot of people I have spoken to in China, they would very much welcome any interesting investment opportunities in the copper field.

Noranda is the likely candidate to build the only major smelter which is presently slated for development. Aside from the Tianjin project, it is expected that most of the remaining investment in copper fields will go to upgrade existing smelters and technically enhance the existing industry.

With regard to the downstream copper industry, an interesting point to keep in mind about China is that it has been experimenting with market reform and some very interesting things have happened. In a shift from a

centrally planned economy to a market economy, the market mechanisms to regulate the economy are lacking, and some very strange things happen. For example, when China decided to import continuous-capacity rods, it became the "in" thing for every province to import a secondhand continuous-capacity mill. According to some of my Chinese friends, the result was that China apparently has continuous-capacity-rod capacity in excess of 1,000,000 tons. Since the country has total copper concentrate mining capacity of about 250, it was a completely irrational decision. One sees a lot of that in various sectors, not just in the nonferrous industry.

Just one comment on the copper trading opportunities for Canadian companies: Chinese traders repeatedly emphasize the fact that they want to deal directly with Canadian producers. In fact, according to people that I have spoken to, it seems that almost no direct business has been concluded; most of the business has been done through the major trading houses. One extreme example of the indirect trade that has been occurring in the copper sector between Canada and China was the sale of Canadian copper concentrate to a Taiwanese smelter. Apparently the vessel sank prior to unloading and the Taiwanese declared *force majeure*. The cargo was eventually salvaged by a Hong Kong agent and sold to China. The Chinese saw this as typical of the way in which business was being done between Canada and China and they hoped very much that eventually there could be more direct contact. There are certainly strong arguments to be made for continuing to involve trading houses because price can often be much more advantageous to both parties. On the other hand, if China becomes a much more important force in the international copper market, it is also very much in Canadian companies' interest to maintain a regular direct dialogue so that companies know when China is going to be in the market and there can be more communications. Certainly, the Chinese are very, very eager to have that type of dialogue.

Lead and Zinc

The development of China's lead and zinc industry holds second place to the expansion of the aluminum industry. China has fairly good lead and zinc deposits and the investment capital required for developing this industry is much less than for aluminum and copper. Also, China has been undergoing an acute shortage of precious metals; most of the silver produced in China is a byproduct of the lead and zinc industry. As with copper, most of the investments will go to expanding the existing production sites. The main lead-zinc area is Gangxu Province, in the northwest of China, which has about ten percent of the country's nonferrous production. There is also the possibility

that by the end of the century China will be developing another major lead and zinc base in Southern China in Yunnan Province.

The impact of China's development in lead and zinc suggests that China will remain a marginal importer of lead metal for the near future, but in the long term it will become self-sufficient and possibly an exporter, particularly to the Asian market.

As for zinc, the mine at Changba has recently undergone expansion. Smelter expansion has been delayed so there has been some export in the last year and opinion is divided as to whether or not this will continue. It seems likely that China will just wait for the smelter to start up, rather than continuing to export. According to most Chinese traders, China will continue to import significant quantities of zinc metal, in the range of 100,000 tons per year. By the mid-90s, China will become self-sufficient in lead and zinc, which is a realistic goal. Whether it will be achieved then or later will depend on many other factors, but China will ultimately import and export according to market predictions.

Nickel

China has the second largest nickel deposits in the world, after Sudbury, in Gangxu Province. The mine and the smelter are currently under expansion. The second phase of the expansion should be completed by 1992/93 and will raise the total capacity in the range of 40,000 tons. There is considerable concern, particularly in Canada, about whether or not China will become the major exporter of nickel. This was exacerbated by China's recent trading patterns: in 1986 China exported around 5,000 tons of nickel and last year around 11,000. This had a really significant downward effect on the market. In fact, it seems quite clear that was a sporadic export; it was done particularly by the officials of Gangxu province, in order to generate foreign exchange to finance the smelter and mine expansion. Some of the senior traders at Minmetals and at China National Nonferrous Metals Import-Export Corporation (CNIEC) are quite annoyed about this. What happened was that China became the major exporter last year when the cycles were low, and this year they are responsible for importing to meet the growing consumption. They ran down their stockpiles last year, and now they suddenly have a real shortage and have to buy at very high consumer prices.

That's not to say that China will not be exporting in the future but it will not be for the sake of exporting the way China exports tons from the nickel industry in order to generate foreign exchange specifically for Ginxhua's project expansion. In fact, it seems that there is considerable unmet demand in the nickel industry, and various attempts are being made to consolidate the understanding of consumption in the nickel industry by the mine managers of

Ginxhua. I would suggest that Canadian companies try to have a closer dialogue with Ginxhua. They already have a very close dialogue with Japanese traders; representatives from various Japanese trading houses go up to the mine every three months just to pay a courtesy call. Ginxhua also sent a major delegation to visit the Soviet Ural nickel smelter this summer and apparently it was quite a friendly visit. The Chinese are also looking for copper nickel matte, which is one of the reasons why they are looking for nickel ore: right now their mine is considerably slower in its development than its smelter expansion.

Canada-China Trade

I believe it *is* important that Canadian companies try and establish some dialogue, although obviously there has not been a happy history. In the past, the way it worked was that there were two people who were responsible for any specific commodity. You'd just go with them and if they liked you, then you just did the business. It was pretty straightforward. You didn't know where the product was going, you had no idea what the parameters were or what the market was doing, but the business was simple.

Obviously, these days the situation is very confusing. The question that most companies always wonder about is the rivalry between Minmetals and CNIEC. The background is that Minmetals was the trading company of the Ministry of Foreign Trade and Economic Relations. It was instituted to implement the state-planned imports and exports. In 1983 when the nonferrous corporation was formed, they were also given jurisdiction to set up their own import and export corporation. In fact, quite a power struggle went on behind the scenes. The fact that CNIEC was given this authority probably owes a lot to the fact that one of the behind-the-scenes board members of CNIEC was Dong Zhiao Peng's son-in-law, who was quite active in seeing that CNIEC was well connected in certain circles and China forgets that authority.

When CNIEC was first established, Minmetals said, "Don't do business with CNIEC; they are going to disappear in two years," and you'd go to CNIEC and they'd say, "Don't do business with Minmetals; they are going to disappear in two years." That was over five years ago. Both companies are doing well. They are doing substantial quantities of business, and in recent months there seems to have been less hostiiity between the two organizations as each of them seems to find differing roles within China's nonferrous trade. They do have very different strengths. CNIEC's competitive edge comes from the fact that many of their traders are people who actually have a production background and understand the technical problems that a factory will have. Many of the traders have gone to school with factory managers from whom they're sourcing. On the other hand, Minmetals certainly has a major ad-

vantage in the fact that it has a very large capital advantage and very shrewd, experienced traders, and increasingly is starting to take global positions. It is doing a lot of trade that has nothing to do with China, but between two other countries, and I wouldn't be surprised if Minmetals eventually develops more and more of that type of business. Certainly, the Chinese have stated that they have the ambition to make companies like Minmetals and CNIEC major international trading houses.

There is something else that is frequently absurd. The import and export corporations are no longer just acting on behalf of the state plan. If a company needs to purchase a certain commodity, they can take that purchase order and go around to various trading companies. A company, for example, that wants to buy 100 metric tons of metal will go to four or five different trading companies, to Minmetals and CNIEC, and the Regional/Provincial Trading House, and to various people. Each of these trading companies has Chinese relatives and contacts, and they shop it around, so the result is a magnification in the market where suddenly everyone is saying the Chinese are in the market for thousands and thousands of tons of nickel and the prices go completely haywire. And all it is is a little factory somewhere in the centre of China that wants about 100 metric tons. This is a very serious problem that I think is something that has to be brought up to the Chinese constantly because it is very destructive behaviour. Some people in Chinese trading circles are starting to acknowledge that it is not in their own best interests either.

As I mentioned earlier, as China moves from being a centrally planned economy to having increasing responsiveness to market forces, there are some very strange phenomena to observe. One thing in particular is pricing of commodities. Right now in China, for major nonferrous commodities, one can find up to four different prices: local production price under the state plan; the input price under the state plan; a free-market input price; and a free-market production price. These prices can sometimes be several times the state-subsidized price. What has happened is suddenly China has decentralized and some smart officials are buying state-subsidized loads of ingots. They are left in the warehouse and sold to somebody, who sells to somebody else, who in turn sells to somebody else. The result is that this state-subsidized commodity eventually makes its way into the market at market prices Of course, there's no market mechanism in place to dampen this effect and so this profiteering has become quite rampant, particularly in recent months. Inflation in China has been reaching 30 to 40 percent in some cities, and a large part of the inflation has been fuelled by this type of profiteering. Although nonferrous metals aren't the *key* examples used in the Chinese press, they are also very much affected by this.

In response to these types of development and other such unforeseen problems, China has recently decentralized some of its policies. For example,

just earlier this year a new Ministry was set up: the Ministry of Raw Materials. The role of this Ministry is to coordinate the production, consumption and imports of various raw materials. It is to be hoped that will encourage more orderly marketing, but it is too early to say. It might end up creating another layer of bureaucracy.

I'm not terribly concerned about the decentralization. I think we're going to see a very slow two years in China, but these kinds of fluctuations have happened before and the overall trend is towards a more market-regulated economy. It should also be kept in mind that China is trying to join the GATT in 1992, so there is also a certain impetus from that direction to keep its market reforms in force. The Chinese always say, when you talk about it, that there is a Chinese proverb: "Three steps forward and one step backward." They have been going several steps forward in the last year, so it is not too surprising that they are taking the step backward. I think decentralization will result in the elimination of some of the regional price discrepancies that I mentioned earlier, and there are also discussions of having regional commodities centres that would be centrally controlled. I haven't heard this considered for the nonferrous industry, but I have heard that the steel industry will be doing it. If the steel industry finds it useful, then it is quite possible it will also be implemented in the nonferrous industry.

There have recently been rumours that China was going to devalue the renminbi which is presently 8.7 to one US dollar. In fact, however, there are now markets for foreign exchange in most of the cities, where the former black-market rates can now be officially traded. Foreign companies can actually buy foreign exchange on these markets as well, at a fluctuating market price that has an exchange rate presently in the range of seven to one. Again, there has been talk about eliminating the two-tier exchange system and they were very close to devaluing the renminbi in 1988, but it was decided there were too many inflationary pressures in the economy. It is quite possible that something like that will take place, if not in 1989, then in the future. Again that would probably have some effect on China's purchasing patterns with nonferrous metals, and that would certainly have some impacts on prices.

To conclude, the Canadian nonferrous industry is extremely strong and the Chinese are experiencing a real explosion in demand. There are many advantageous conditions for Canada-China trade. I would encourage companies to look seriously at China markets, not just for their indirect impact on Canadian companies' business but also as a very major market opportunity.

CHANGING PATTERNS OF MINERAL TRADE

John E. Tilton

Mineral trade patterns reflect both the overall level and the direction of international trade. For a number of reasons these patterns have experienced considerable change over the last several decades.

First, most mineral commodities at one stage of production or another enter international trade, as mining for primarily geological consideration is concentrated in a handful of countries while consumption for economic reasons is equally concentrated but in a different set of countries (namely the major industrialized states). Consequently, the rapid expansion in the consumption of mineral commodities throughout the world from the end of World War II until the early 1970s produced a correspondingly brisk rate of growth in mineral trade.

Second, comparative advantage has been a restless companion, bestowing its charms and blessings on one new producer after another. For example, Jamaica replaced Surinam as the world's largest bauxite producer in the 1950s. It, in turn, was overtaken by Guinea and Australia during the 1970s. More recently, Brazil has become a major producer.

Third, the economies of the major consuming countries and in turn their needs for mineral commodities have grown at quite different paces. In particular, the United States, which consumed over 40 percent of the entire world's production of steel, aluminum, and copper in 1950, has seen its share of mineral commodity consumption decline as economic recovery and growth occurred first in Europe and then in Japan.

Fourth, the dismantling of the aging colonial empires that survived World War II and the rise of economic nationalism throughout most of the developing world over the last 30 years have led to the nationalization of many former subsidiaries of multinational mining companies, and fostered the rapid growth of state enterprises in the mineral sector around the world. These developments have raised the awareness of political risk, altered the international flow of capital for exploration and mineral development, and in other ways severed traditional trading relationships between developing and industrialized countries. These considerations, which have discouraged mineral production in the Third World, have helped the developed mineral-producing countries, particularly Canada, Australia, South Africa, and even the United States.

Another important political force distorting mineral trade patterns since World War II has been the political polarization that divided the centrally planned and the market economy countries, and the reluctance of either group to become too dependent on mineral imports from the other. As a result,

mineral production and trade have largely taken place within each group with very little exchange between the two.

This brief review of several major forces shaping world mineral-trade patterns since World War II, though incomplete, is sufficient to illustrate the dynamic and changing nature of international trade in this field. To the extent history is a reliable guide to the future, it also suggests that we should expect important changes in the future as well. This in turn, raises the question: What are the important forces, now germinating, that will produce changes in mineral trade patterns? And, what kinds of changes will result over the next decade or two?

A complete answer to these questions is probably beyond our current state of knowledge, and in any case is not attempted here. A more modest task is instead pursued: namely, to examine four relatively recent developments and to consider how they might alter mineral-trade patterns over the next 10 to 20 years. The focus is on nonfuel mineral commodities, and in particular on steel, aluminum, copper, and other major metals.

Growth of Metal Consumption

The rapid long-run growth in consumption following World War II stalled in the early 1970s for all of the major metals. This abrupt slowdown, illustrated in Figure 1 for OECD countries, was unanticipated, and at first was assumed to be simply another temporary downturn associated with a decline in the business cycle. However, metal consumption has not over the intervening 15 years recovered its old growth trajectory, and clearly something more fundamental and structural occurred in the early 1970s.

In light of its importance, the decline in growth and its causes have attracted considerable attention in recent years.[1] Part of the slowdown, though only part, can be attributed to slower economic growth. As Table 1 shows, the annual growth in GDP for the OECD countries, which averaged 5.0 percent over the 1960-73 period, dropped to 2.4 percent over the 1973-85 period.

The other important factor contributing to the slowdown, as Table 1 also indicates, was the declining trend in intensity of use, which reflects the tons of a metal consumed per billion dollars of real GDP. The fall in intensity of use in recent years can be attributed to various factors. Some point to the

[1] For a survey of this literature and a list of references, see Tilton (1988).

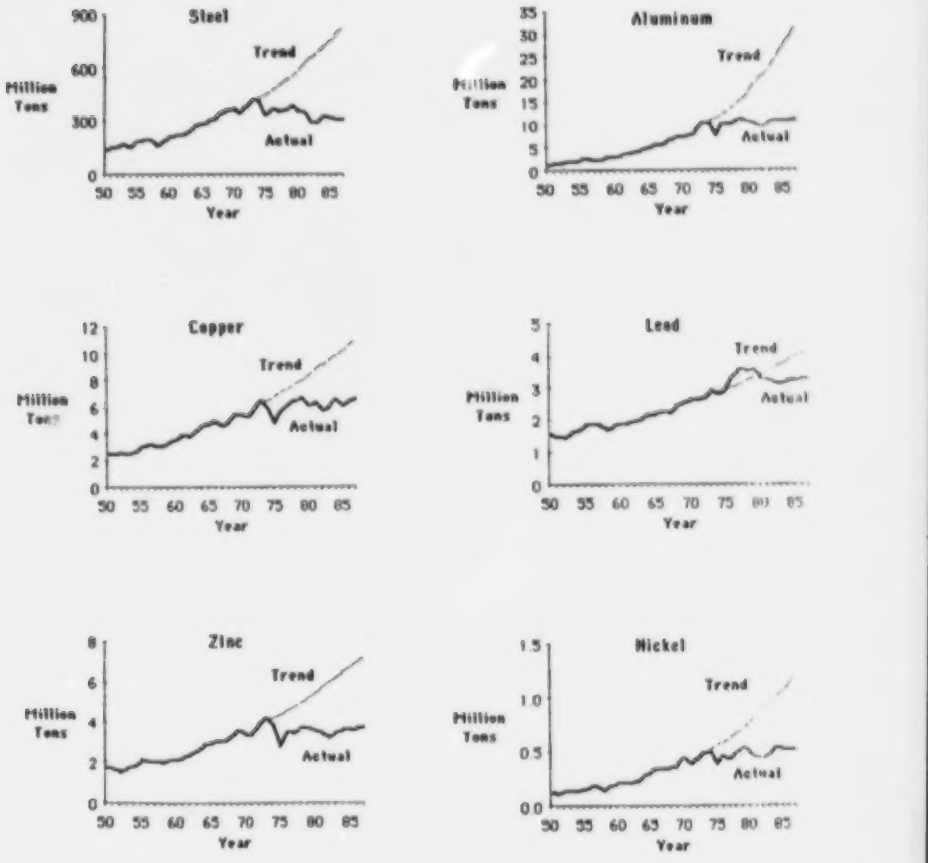

Figure 1. OECD Consumption of Steel, Aluminum, Copper, Lead, Zinc, and Nickel, Actual and Trends, 1950-87

Figure 1 (Continued)

Notes:

Consumption generally is for refined metal, and excludes the direct use of scrap Aluminum consumption is solely primary metal. Nickel consumption includes the nickel consumed in nickel salts and other chemicals. Steel consumption figures are for crude steel, and include both primary and secondary metal.

Sources:

Metallgesellschaft Aktiengesellschaft (annual) for aluminum, copper, lead, zinc, and nickel; International Iron and Steel Institute (annual) for steel.

Table 1

Growth of GDP and Intensity of Use in the OECD Countries,
1960-1973 and 1973-1985
(Percent)

Time Period	GDP	Intensity of Use					
		Steel	Aluminum	Copper	Lead	Zinc	Nickel
1969-73	5.0	0.3	4.5	-0.4	-1.5	0.3	1.5
1973-85	2.4	-4.5	-2.1	-2.6	-1.6	-3.6	-1.9

Sources: Tilton (1988), Table 3.2, and the sources cited there.

point to the rise of plastics, ceramics, composites, and other alternative materials that are replacing the major metals in a number of end uses. Others focus on resource-saving new technology that allows bridges, buildings, automobiles, beverage cans, telecommunication systems, and other products to be constructed with less steel, aluminum, and copper. Still others note the rise of computers and other high-technology products within the manufacturing sector, whose consumption of traditional metals per unit of value added is far less than more traditional manufactured products. Another view emphasizes the role of sector shifts, in particular the rise of the service sector and the decline of the construction and capital equipment sectors.

If explaining the past is complicated, anticipating the future growth of metal consumption is even more difficult. Some scholars are quite pessimistic in the sense that they anticipate declining metal consumption at least in the industrialized countries, which still constitute the major market for metals. Drucker (1986), on the basis of demand trends since the early 1970s, believes that material consumption is now uncoupled from overall economic growth. Larson and others (1986) see an end to the era of metals and materials. Others, however, are more optimistic, and do not necessarily rule out a return to the rapid growth of metal consumption of the 1950s and 1960s, particularly in light of the potential metal consumption in many developing countries.

My own view, which is spelled out in more detail in Tilton (1988), is that world metal consumption will expand during the 1990s, but at a more modest rate than prevailed during the Golden Age of metal growth of the 1950s and 1960s. The optimists are probably right that much of the future growth in metal markets will likely occur in developing countries, a point we will return to in the next section. However, the unusually rapid pace of world economic growth during the 1950s and 1960s, in part reflecting the recovery of the industrialized world from World War II and the Great Depression, is not likely to return soon. In addition, though intensity-of-use trends may improve, it is hard to envisage their recovery to the quite favorable situation of the early postwar period when, for many of the major metals, intensity of use was rising.

If this vision of the future is correct, it suggests mineral commodity trade will continue to expand during the 1990s. While the rate of expansion is unlikely to approach that of the 1950s and 1960s, it should equal or surpass that of the past decade.

Location of Metal Consumption

Another development likely to alter mineral trade patterns is the continuing shift in the geographic location of metal consumption. Earlier we noted that

the dominant position of the United States among the world's major metal consumers declined after 1950 as first Europe and then Japan increased their consumption, causing a shift in the location of metal consumption among the industrialized countries that appears to have largely run its course by the early 1980s.

Throughout this period an expected shift in metal consumption toward the developing countries never materialized, at least on anything like the scale anticipated. Bedeviled by a variety of problems, the economies of these countries for the most part just never grew as rapidly as the forecasts predicted. What promised to be a favorable takeoff in the early 1970s for Brazil and a number of other countries was grounded first by sharply higher energy prices in the 1970s and then by the international debt crisis in the 1980s.

There have, however, been two notable exceptions to this disappointing picture: the rapid economic development of China and of a handful of developing countries on the Pacific Rim. While world crude-steel consumption grew on average by only 0.3 percent a year between 1973 and 1986, rising from 697 to 724 million tons, China's consumption surged from 31 to over 75 million tons or almost seven percent a year. In 1986, the country accounted for over ten percent of world steel consumption, and surpassed the United States as the largest importer of semifinished and finished steel products (IISI, 1987).

Steel consumption has also surged in the Republic of Korea, rising from under three to almost 12 million tons between 1980 and 1986, or on average by over eleven percent a year. In the case of such newly industrializing countries (NICs), however, it is not clear to what extent rising metal consumption reflects domestic demand and to what extent it reflects trade and development policies designed to stimulate exports of metal-intensive products. Some preliminary evidence in the case of Korea suggests that rising steel consumption was primarily the result of domestic demand until the late 1970s and of metal-intensive exports during the 1980s (Hwang, forthcoming). This is important because rising metal consumption due primarily to the promotion of metal-intensive exports in one country will be largely offset by a corresponding reduction in metal consumption elsewhere.

In any case, the recent shift in steel and other metal consumption toward China, Korea, and other Asian NICs has altered mineral trade patterns either for the refined metals themselves or for the ores or concentrates from which they are produced. Though it is not certain, it seems likely that these countries will maintain their relatively rapid economic development during the 1990s (though perhaps at somewhat more modest pace) and that this growth will continue to influence mineral trade patterns.

Other shifts in the location of metal consumption are also possible. The resolution of the international debt problem would accelerate the economic growth of Brazil, Mexico, Argentina, and other Latin American countries,

stimulating their need for metals and other mineral commodities. The proposed elimination of all barriers to trade within the European Economic Community by 1992 could intensify competition and economic growth in that region, fostering metal consumption in the process.

Company and Host Government Accommodation

A few multinational mining companies, based in the United States and other industrialized countries, controlled the lion's share of production of the major metals outside the Communist countries at the end of World War II. Vertically integrated, they owned mines and processing facilities in both the industrialized and developing countries.

As pointed out above, however, the collapse of colonial empires and the rise of economic nationalism led to a particularly difficult period for foreign mining companies during the 1950s and 1960s as host governments, particularly in the developing countries but also in some developed countries, challenged their authority. Confrontation in a number of instances resulted in nationalization and the creation of state mining enterprises, an important trend which Radetzki (1985a) has documented. This confrontation was often accentuated by the belief that the companies were earning large profits, little of which they were sharing with, or even leaving in, the host country. It was also widely assumed that the companies and the industrialized countries in turn were dependent on the mineral-producing countries and their governments for the vital raw materials required to keep their economies going. Mineral resources, in short, were thought to provide the leverage needed to force the advanced countries to offer the financial and other assistance the developing countries needed to grow. The companies, on their part, were generally reluctant to share equity with the host government or nationals, and resisted attempts to regulate or control their activities.

Though difficult to document empirically, there is little doubt this confrontation slowed the shift in mineral exploration and mine development toward the developing countries. Had it not occurred, the latter would probably be supplying a larger share of the world's mineral output and the United States, Australia, Canada, and South Africa less.

Over the last 15 years, however, much of the rancor in the relationships between foreign mining companies and host governments in developing countries has disappeared. Given the enormous amount of capital now required to develop new mining ventures, many companies now desire to share ownership with other partners and to rely much more on debt financing. Equity participation by the host government, even majority control, can leave the company in charge of operations, and at the same time provide some useful insurance against political risk. Host governments, on the other hand, are now

more sensitive to the problems of the companies, in part the result of their experience with state mining enterprises during the generally depressed metal markets of the last 15 years. Many are now anxious to encourage the multinational mining companies to help develop their mineral sector, and aware that their policies are important in achieving this goal.

All of this suggests that the developing countries could see their share of the investment in new mines and processing facilities increase during the 1990s. In this case, more of the world's output and exports of the major metals will come from this group of countries.

Changes in the Centrally Planned Countries

For the Soviet Union and a number of other centrally planned countries, the decade of the 1980s is an era of economic and political reforms, stimulated in large part by the faltering growth of their economies and their apparent inability to provide the quality and diversity of consumer goods available in more market-oriented economic systems. While one hears much these days about the current efforts of the Soviet Union to introduce glasnost and perestroika, Hungary in its own quiet way has been pursuing such policies for a number of years.

China as well has been ahead of the Soviet Union in its reform movement. Following a long period of autarky, political upheaval, and poor economic growth, Mao Zedon and Chou En-Lai died in 1976, the year that also saw the collapse of the Gang of Four. The new government introduced a development plan with a number of important economic reforms. Heavy industry, including the mining and processing of metals, was emphasized. Autarky was abandoned and for the first time since the creation of the People's Republic in 1949, foreign borrowing and imports of technology and equipment were encouraged. While the emphasis shifted in 1979 away from heavy industry and toward agriculture and light industry, efforts to integrate China into the world economy have continued. Foreign investment and technology are still much desired, and the country continues to import from abroad products considered essential for maintaining the rapid rate of economic growth the country has enjoyed since 1976.

While it is probably premature to speculate on the ultimate success of the new reform policies in the Soviet Union and a number of its Eastern European allies, just how these policies might affect the patterns of world metal trade is nevertheless worth considering. In the case of China, where reforms predate the current Soviet efforts by a decade, the emerging picture is somewhat clearer. Initially, it was widely assumed that the opening up of China would break down the historical barriers isolating that country's mining and metal-processing sectors from the rest of the world. The prevailing view saw

the domestic production of metals expanding rapidly, allowing the country to become an important new metal exporter. Even before 1976 China had been an important exporter of antimony, tungsten, and vanadium. The inflow of foreign technology and capital would permit the development of its vast resources of other metal commodities.

In retrospect, the prevailing view was correct in the sense that reforms have produced a greater integration of the Chinese economy, including its mineral sector, with the rest of the world. Reforms have, however, stimulated metal imports far more than exports, and in particular imports of steel, aluminum, copper, and other major metals. As noted above, China in recent years has replaced the United States as the world's largest importer of steel.

Radetzki (1985b) attributes the large and growing deficit in Chinese mineral trade to three factors: the country's strong comparative advantage in labor-intensive products; mineral reserves for at least the major metals that are not particularly extensive or of high quality; and, finally, the rapid increase in the country's domestic metal consumption. Of these, the latter factor is probably the most important. It reflects the fact that the country's metal requirements, given the rapid economic growth stimulated by reforms, have simply outstripped the country's ability to expand its capacity to produce steel and many other metals. The Chinese, despite the deemphasis of heavy industry in 1979, are trying to correct this imbalance, and eventually the deficit in mineral trade may decline. This does not imply, however, a return to autarky and isolation. The Chinese mineral sector is today much more of an integral part of world mineral markets, and is likely to remain so for the foreseeable future, barring a radical reversal in Chinese policy.

Reforms in the Soviet Union are at a much earlier stage, so speculating on the consequences for metal trade patterns is somewhat more hazardous. If successful, however, they are likely to produce somewhat different results than has been the case for China. In particular, given the tremendous mineral reserves of the USSR in Siberia coupled with the exhaustion of many deposits west of the Ural Mountains, reform is likely to accelerate the eastward shift of metal production within the country, with two possible consequences for world metal trade.

First, the growing demand for metals in Japan, the Republic of Korea, and other neighboring countries may stimulate Soviet metal exports to the Pacific Rim countries, particularly as these states have the capital and technology to help the country develop its vast eastern resources under its new joint-venture legislation.

Second, Soviet shipments to Eastern Europe, the country's historical market for metal exports, may stagnate or decline, as shrinking output in the western part of the country and the costly overland transport of minerals mined in the east will make it increasingly difficult for Soviet Union to supply its own industries, still heavily concentrated west of the Urals.

For the Soviet Union's allies in Eastern Europe, reforms are also likely to affect metal trade patterns. Unable to supply their own needs, these countries depend on metal imports. If Soviet supplies become more difficult or costly to acquire, as suggested, they will have to turn to producers in the West. Consequently, economic and political reforms in the Soviet Union and Eastern Europe, as in China, are likely to alter trading patterns and enhance the integration of world mineral markets.

Metal trade patterns have changed greatly, both in terms of their overall level and direction of flow, over the last several decades, and will almost certainly continue to evolve over the coming decades.

The forces shaping the future are many. The four considered here suggest the overall level of metal trade will grow during the 1990s. The pace of growth, while falling short of the brisk growth of the 1950s and 1960s when world metal consumption was rising rapidly, will probably exceed that of the last ten years.

The direction of trade is also likely to change, with the developing countries enjoying an increasing share of world exports, thanks in part to their more accommodating policies toward foreign mining companies. Similarly, the developing countries, particularly the newly industrialized countries on the Pacific Rim, such as the Republic of Korea, are likely to see their share of world imports grow, as their overall level of economic growth exceeds that of the United States and other more developed countries.

Finally, political and economic reforms in the centrally planned economies, if successful, may well reduce the barriers that have for so long separated the mineral markets of these countries from those of the market economy countries. This raises the possibility of larger, more universal markets for the metals and other mineral commodities entering international trade with trade flows governed more by economic efficiency and less by political concerns.

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THE TWO PRICING SYSTEMS FOR NONFERROUS METALS

Margaret E. Slade

I Introduction

Nonferrous-metal sales in North America have traditionally been conducted under a system known as producer pricing. Producer prices are set by the major firms in the industry. These prices change only at discrete intervals and tend to have smaller variances than exchange prices. Exchange or terminal prices, in contrast, are related to price quotations on the major metal exchanges, principally the London Metal Exchange (LME). These prices have traditionally been more influential outside of North America.

In the late 1970s and early 1980s, radical changes occurred in the pricing of many nonferrous metals. This period saw the virtual demise of the producer price of copper and the introduction of aluminum and nickel contracts on the LME. These events were followed by the suspension of publication of producer prices for these commodities. Even those industries where producer prices remained relatively stronger were affected. The same period saw a tendency for the producer price of lead to follow exchange prices more closely and, more recently, the widespread practice of discounting the producer price of zinc.

This paper analyzes the changes that have occurred in nonferrous-metal pricing in the last ten to fifteen years. It is not a discussion of how price levels are determined. Instead, it attempts to explain why producer prices have been weakened and to assess the consequences of increased reliance on metal exchanges.

Particular attention is paid to the causes and consequences of the price volatility that has characterized nonferrous-metal markets. This issue is of concern to producers and consumers alike as it makes planning for orderly growth difficult and contributes to the gluts and shortages that have plagued these industries.

The organization of the paper is as follows. The next section describes the two pricing systems and assesses their relative merits. Section III discusses the factors that affect price stability and section IV analyzes the differences in the behavior of the prices which are set under the two systems. Finally, section V summarizes and concludes.

II The Two Pricing Systems

Exchange Prices

Many commodity exchanges exist throughout the world. The most important for metal pricing, however, is the London Metal Exchange (LME). This exchange dates back to the middle of the nineteenth century.[1] Three nineteenth-century developments were fundamental in the evolution of a modern market: the introduction of a standard contract, the change from forward dealing for delivery to hedging, and the growth of speculation.

Superficially, the LME today closely resembles its 19th-century ancestor. Membership in the Exchange is still limited to thirty-six, the number of seats in the curved wooden benches that form the 'Ring.' Dealings in each commodity are still limited to two five-minute intervals in the morning and two in the afternoon. Members still transact business by means of open outcry across the floor; bids and offers may not be directed at individual firms but must be to the entire Ring. And finally, an official price for each commodity is still established every morning. Prices are usually selected as the last best bid and offer prevailing at the close of the Ring.[2]

In spite of the superficial similarities with the past, the LME underwent a fundamental reorganization in 1987. This reorganization was due to general misgivings about the nature of regulation of investment business in the UK. It was further aggravated by the tin crisis of 1985, when LME tin trading was suspended indefinitely.

Three major changes were instituted in 1987. The first was the switch from a principals' market (a market where members act as principals for the transactions that they conclude across the Ring and with their clients) to a clearing-house system. A clearing house is an independent body that clears and guarantees business transacted between member brokers.

The second was the introduction of margins. The LME system of margins is unusual, however, in that it applies only to the net position of brokers. The clearing house looks at a member's total exposure when calculating margins. In-credit positions can therefore compensate losses on risk positions. The final innovation was the introduction of formal options.

The only real competitor to the LME in terms of metal trading is the Commodity Exchange of New York (COMEX). With the exception of copper, however, it is clearly of secondary importance. Nevertheless, a brief

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[1] For a history of the LME, see Rudolf Wolff (1987).

[2] The word Ring has two meanings: the physical circle of carved benches and the five-minute trading intervals for each commodity.

description of COMEX is in order. The clearing-house system for COMEX was established over 50 years ago and COMEX has always required margins. In addition, membership is without formal limit and usually numbers in the hundreds. A final distinction is that the volume of speculative activity is greater on COMEX than on the LME, where "legitimate" trade dominates.

Producer Prices

Producer prices are those set by the major North American firms in the industry.[3] These prices change only at discrete intervals and have smaller variances than exchange prices. Most often, the producer price is the price of refined ingot. Other products and shapes may sell at premiums and discounts, but their prices will usually be tied to this single price.

The exact method of producer-price determination varies by commodity. There are however, broad similarities. The North American producer price of copper is therefore discussed in some detail to give a feel for this general class of pricing. Because the producer price of copper is no longer the predominant North American copper price, the period of the 1970s is described.

The producer price of copper was that set by the major American and Canadian primary producers and was the price at which most domestic refineries sold copper metal to affiliated and independent fabricators. In the mid-1970s, about 75 percent of refined copper in North America was sold at this price. The producer price represented a common set of price quotations for delivery of refined copper to any place in the nation. This price was based to a large extent on production cost and was moderately stable.

Some refinery shapes sold at slight discounts and others at premiums, but the prices of all shapes were tied to a single price - the producer price. Copper-product prices (the prices of sheet, tube, wire, castings, and so forth) followed the price of refined copper closely. It therefore seems reasonable to speak about *the* producer price of copper.

It is important to note that the producer price is a price that is announced by the companies for current sales. It is not a long-term-contract price. Contracts can be based on this price, but they can also be based on exchange prices. The producer price guarantees neither security of supply nor stable future prices.

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[3] The one exception is zinc, which also has a European producer price.

Relative Merits

Both exchange and producer-pricing systems have their virtues and their flaws. In this section, I try to summarize the salient pros and cons of each. The discussion, however, should not be interpreted as an attempt to pick a winner or to advise producers which system to use. It should become clear that the choice of system is determined to a large extent by structural conditions within the industry. It should also be clear that there is no single system that works best for all commodities.

A major difference between the two systems relates to the players in the game. Producer prices are determined by producers and, to a lesser extent, by consumers. On commodity exchanges, new actors are introduced - brokers, merchants, and speculators. This introduction has both benefits and costs.

Hedging is one of the benefits. Hedging is defined as the establishment of an opposite position on a futures market from that held and priced in the physical commodity. The practice of hedging, by removing the risk of price fluctuations, provides insurance to both consumers and producers. And in fact, the desire to hedge was one of the primary reasons for the founding of the LME and other exchanges.

Speculation can be both a cost and a benefit. In markets that are primarily speculative, prices may bear little relationship to underlying production cost or value in use. This, however, need not be the case. When commodity markets are dominated by legitimate trade, their prices, which are sensitive to supply and demand factors, possess the virtues common to all competitively determined prices.

A speculator enters a market to realize a profit. This in itself is not a bad thing. And as a consequence, the speculator provides services. In times of surplus, producers and consumers can always find a buyer for unwanted metal, and in times of shortage, they can find someone willing to sell. Rationing, therefore, never exists on commodity markets.

The relationship between speculation and price destabilization is discussed in the next section. Here it suffices to note that exchange prices are in fact more volatile than producer prices. This can create a problem for producers, who must make production and investment plans, and for consumers, who need to forecast raw-material costs. Hedging, which is a partial solution to this problem, cannot provide insurance against very long-run price swings.

The most common complaint about exchanges is that prices are too volatile. Volatility creates problems if unstable prices provide the wrong signals. High prices, for example, may be taken as signals of long-run profitability and may therefore lead to excessive investment in new capacity. Low prices, in contrast, may signal bad times ahead and may discourage exploration more than is warranted by the underlying fundamentals.

Excessive volatility may also cause consumers to substitute away from metals sold on exchanges. If consumers prefer stable prices for planning purposes,[4] and if substitute materials are sold under arrangements that facilitate price stability, metal-conserving technological developments may be triggered in the using sectors.

A significant advantage of exchange-determined prices, however, is their transparency. LME and COMEX prices, which are published continuously, have worldwide visibility. In addition, unlike producer prices, they are always true transactions prices and are uniform across customers.

Other advantages include the fact that contracts are never broken.[5] The LME, for example, does not have a *force majeure* clause in its contracts. An exchange therefore provides a dependable contractual arrangement in which everyone can participate at prices that are the same for all. In addition, because rationing is never an issue, customers can purchase all the metal that they want at the going price.[6]

Another useful function of exchanges is their inventory-carrying role. With an exchange system, there is never a need for a potential seller to hold unwanted stocks. And, when excessive inventories cause the contango (the positive difference between the forward and spot prices) to widen, banks can step in. They do this because, by holding inventories, they can earn higher-than-normal returns. The size of the contango therefore does not normally exceed the cost of financing, insuring, and storing metal.

Unfortunately, an exchange-pricing system does not insure against cartel manipulation and prices that are persistently above marginal costs. One need only consider the 1985 tin crisis to conclude that prices determined on exchanges are not synonymous with competitive prices. Nevertheless, it is generally the case that an exchange price more closely approximates the competitive norm than does its alternative.

In contrast to exchange prices, producer prices, which are normally based on fundamentals, are relatively stable. Consumers may prefer the security provided by price stability. In addition, by doing away with the need for a broker, a producer-price system can foster a bond between buyer and seller.

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[4] There has been much discussion in the literature about whether price stability is desirable (see for example, Oi 1961). Nevertheless, all producers and consumers interviewed stated that they preferred stable prices.

[5] An exception to this statement is when governments fail to honor their obligations, as may have happened with the tin crisis.

[6] When markets are thin, however, a single large purchase can affect price.

When the buyer is a vertically integrated subsidiary, the producer can, to some extent, fix the price of the basic raw material used by its downstream operation. And in the extreme case of complete vertical integration, there is no useful role for an exchange to play.

Producer prices also facilitate control over market conditions. For example, by setting price below the LME price, producers can clear warehouse inventories. Conversely, by setting price above the LME price, they can provide stability in a falling market.

Control over price can, however, be costly if improperly exercised. For example, most specialists agree that the producer-price of nickel was set too high in the late-seventies, a fact which contributed to its own downfall. Prices can also be set too low, as was the case with the Climax price of molybdenum at the turn of the decade. By setting the price too low, AMAX exacerbated the already existing shortage.

When the producer price is the only price and it is suspended, the result is a free-for-all (a situation that occurred in the nickel market in 1977). Markets without well organized commodity exchanges are therefore more vulnerable to actions by a single firm or small group of firms.

A final disadvantage of producer prices is their lack of transparency. This situation is especially acute when discounting off published prices becomes rife. Under these circumstances, it is impossible to tell what one's competitors are paying for their raw materials.[7]

At this point, it is perhaps helpful to list circumstances that tend to lead to greater reliance on exchange markets. These include

- an increase in the number of sellers;
- an increase in the number of buyers;
- a fall in vertical integration;
- an increase in government participation;
- an increase in the geographic integration of markets;
- an increase in product standardization;
- an increase in secondary production.

A glance at these factors should convince the reader that the greater reliance on exchange prices that has characterized the past decade is a symptom more than a cause. As metal markets have become more competitive and more international, the inevitable result has been a weakening of the traditional producer-pricing system.

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[7] This is not always a disadvantage. Producers may prefer to price discriminate and consumers may prefer to have their raw-material costs remain secret.

III Factors Affecting Price Stability

This section analyses the principal determinants of price volatility in metal markets. Primary attention is given to the factors that vary across commodity markets. For example, all metals are industrial goods and therefore their prices are affected by fluctuations in industrial activity. Second, all are durable and therefore their prices are affected by inventory swings. And finally, all are capital-intensive and subject to long delays in expanding capacity. These common factors, although very important, are not discussed in what follows.

Marketing Method

When commodity prices are set by producers, all purchasers of the good are consumers. When they are sold on exchanges, in contrast, new actors are introduced - brokers and speculators. Differences in motives across agents can lead to differences in price behavior.

Do speculators destabilize prices? Perhaps the first to ask this question was Adam Smith (1789). Since that time, many have written on the subject. The conventional wisdom says that speculation stabilizes prices. Speculators, if they are to realize a profit, must buy cheap and sell dear. Low prices should therefore be increased and high prices lowered. It would thus seem that speculation can destabilize prices only if speculators, on average, lose money.

The question, however, is not quite so simple. Speculators do not buy when price is low; they buy when the chance of price appreciation is high and sell when the chance is low. Recently, many economists have studied this question. For example, Hart (1977) notes that sophisticated speculators can earn a profit by exploiting the naive forecasting rules of less sophisticated agents. And Newbery (1984b) demonstrates that if a producer has market power, then even if all agents are equally rational and have the same information, it may pay the dominant producer to destabilize the spot market by engaging in destabilizing speculation.

Finally, Newbery (1987) addresses the question of whether hedging can destabilize prices. He shows that it is not necessary for agents to be unsophisticated or to possess market power for instability to result. Newbery's finding stems from the fact that futures markets, by introducing hedging and thus providing participants with insurance, may encourage them to engage in more risky activities.

Many active participators in metal markets share the concern of academic economists. For example, Simon Strauss, vice president of ASARCO, notes that

> The classic theory is that speculators help to stabilize markets by purchasing commodities when demand slumps and by selling when demand revives. Long observation of the mineral markets appears to warrant the opposite conclusion. Speculative buying interest is greatest when concrete evidence develops that an economic upturn is in the making, with expectations of a revival of industrial purchasing. In periods of economic downturn, speculators are disinclined to buy industrial commodities. They wait for positive signs of recovery before re-entering the market. (*Strauss*, 1986, p. 105).

Horizontal-Market Structure

Horizontal-market structure refers to the number and size distribution of firms in a market. An industry with few firms or with a dominant firm that controls a large share of the market is said to be horizontally concentrated.

There are many reasons why prices might be more stable in concentrated industries. One of the most important is the availability of instruments to the firms in the market. In a competitive market, firms are price-takers. As prices fluctuate, producers can alter the level of their output but they cannot control price directly. In a concentrated industry, in contrast, firms can choose to vary price, output, inventories, or some combination of the three in response to fluctuations in demand. This higher degree of control usually results in more stable conditions.

When price is to some extent controlled by individual firms, managers must weigh the costs and benefits of changing prices. Economists have focused on three factors that might lead managers of firms in concentrated industries to choose not to adjust prices continuously and fully. All are related to the costs associated with price changes. The three types of costs are fixed, variable, and monitoring costs.

Fixed costs are incurred each time that a price is changed.[8] Such costs are independent of the size of the change. When, for example, a new price schedule must be printed, a fixed cost is incurred. With fixed costs, there is an incentive to adjust prices infrequently but by large amounts.

Monitoring costs are closely related to fixed costs. When optimal prices are costly to determine, prices may be reviewed only periodically. Such costs also lead to infrequent price adjustments.

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[8] Barro 1972 and Sheshinski and Weiss 1977, for example, discuss fixed costs of price adjustment.

Variable costs, in contrast, increase with the size of the price change.[9] If it is costly for consumers to stay informed of relative prices of substitute materials, they may prefer frequent, small price changes. It is clear that behavior of producer prices in the nonferrous-metal industries more closely resembles the predictions of the fixed-cost models.

Inventories can also play an important role in stabilizing prices in concentrated industries. Newbery (1984a) notes that dominant firms often hold much larger inventories than their market share would warrant. This behavior can be explained as follows. The benefits of price stabilization accrue to the industry as a whole whereas the costs are private. Price stabilization is therefore to some extent a public good. Only firms with a large share of the market can capture a sufficient fraction of the benefits to warrant engaging in private stabilizing activities.

Supply Factors

Factors affecting price stability on the supply side of the market include cost stability, recycling activity, and byproduct production.

Cost is clearly an important determinant of price. For example, one of the factors that have contributed heavily to changes in relative metal prices in the last two decades has been the cost of purchasing energy. In addition, the availability of cheap energy sources has been a major determinant of the location of new refineries and smelters that have been constructed in recent years.

Changes in wage costs across regions have also been very important in determining the competitive strengths of producing countries. For example, the United States have been more successful than Canada in controlling labour costs. This has enabled the USA to remain competitive in spite of a decline in the quality of many metal ores mined.

Secondary production, or recycling, is an important source of supply in many nonferrous-metal markets. Recycling costs are sensitive to the quality of material processed. For this reason, the recycler is often the marginal producer. If there is little secondary production when prices are low, coupled with heavy production when they are high, recycling will stabilize metal prices. If, on the other hand, there is a large recycling sector processing very low-cost material, prices will have to fall very far to clear the market in a downturn. The effect of increased recycling on price stability is therefore ambiguous.

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[9] Rotemberg 1982, for example, discusses variable costs of price adjustment.

Joint production is common in metal mining. When two metals are of roughly equal importance in a mine, joint production is labelled coproduction. Under these circumstances, joint costs are often allocated to the two in proportion to their respective price-weighted volumes. A byproduct, in contrast, is considered of only secondary importance. Under these circumstances, joint costs are allocated solely to the primary product. Byproducts are thus a cheap source of supply and, as a consequence, supply can be insensitive to price at the low end of the market.

There is another reason why byproducts are associated with price instability. Metals occur in ores in roughly fixed proportions. Byproduct supply is therefore apt to be more sensitive to the price of the primary product than to its own price. Both of these factors point in the same direction - markets where byproducts are important should have unstable prices.

Demand Factors

On the demand side of the market, there are two important factors that affect price volatility: the stability of end-use markets and the ease with which other materials can be substituted for metals in downstream production.

When the output of the using sectors is highly variable, we expect to see increased metal-price instability. From a practical point of view, however, there do not seem to be very significant differences in end-use stability across metal markets.

If metals were combined with other inputs in fixed proportions, end-use stability would be the sole determinant of demand stability. Fixed-proportion production, however, is rare. When substitution is easy, a high metal price will trigger a switch to an alternative material. For this reason, we expect to see that ease of substitution in the downstream industries is associated with stable metal prices.

Time-Period Factors

Two important determinants of price stability vary by time period but not by commodity. These are exchange rates and inflation rates.

Metals are traded in international markets. Both the dollar price of metals quoted in pounds and the pound price of metals quoted in dollars, for example, will fluctuate with changes in the dollar/pound exchange rate. In addition, mining costs are paid in many currencies. As pound and dollar exchange rates fluctuate with respect to these currencies, we expect to see changes in metal prices. Periods of exchange-rate volatility are therefore expected to be associated with metal-price instability.

Finally, high rates of inflation should also be associated with unstable prices. As the overall price level changes, firms must adjust their prices to reflect changes in input costs. And, as the nature of adjustment to inflation varies from industry to industry, we expect both absolute and relative-price volatility to be associated with high inflation rates.

IV A Comparison of Prices Determined under the Two Pricing Systems

The previous section contains an informal analysis of the factors that lead to price instability. Here, in contrast, we wish to assess differences in price stability across pricing mechanisms somewhat more rigorously.

The analysis pertains to the 1970-1986 period. The seventeen-year period is split into two subsections - the 1970s and the 1980s. Several important events occurred at the end of the decade that make this a natural division. These include the introduction of aluminum and nickel contracts on the LME and the silver-market bubble of 1980. It was therefore considered of interest to test if the periods are noticeably different.

All commodities that are currently traded on the LME are considered in the analysis. These are aluminum, copper, lead, nickel, silver, and zinc. Price data are monthly. A detailed description of these data is contained in Slade (1988a). In particular, it should be noted that *all data used are representative of actual transactions*. Because discounting off list price has always been prevalent in the aluminum market, it was necessary to construct a measure of a transactions price for the aluminum-producer price.

Tables I and II contain summary statistics for levels and rates of change of prices. The tables show means, variances, minima, and maxima. Aluminum and nickel were not traded on the LME until the late 1970s. In addition, producer prices for nickel were not published in the second period. The producer price of copper ceased to be important in the late 1970s and is now no longer published. Silver has never been traded on a producer-price basis. And finally, zinc, unlike the other commodities, trades in Europe on a producer-price basis. There are thus twenty price series listed in the tables.

The measure of price instability that is analyzed is the variance of percent changes in commodity prices, which I denote $VPCP_{ijt}$. The subscript i stands for commodity i (aluminum, copper, lead nickel, silver, or zinc), j stands for time period t (1970's or 1980's). These are the numbers found in the third column in table II.

The prices used are nominal. Deflating would make little difference since both numerator and denominator would be divided by an overall price index. In addition, it is interesting to test whether inflation-rate or exchange-rate volatility is a stronger determinant of price instability.

TABLE I:

SUMMARY STATISTICS FOR PRICE LEVELS

Price	Period	Mean	Variance	Minimum	Maximum
Aluminum					
Producer	I	39.4	79.8	24.4	53.9
Producer	II	58.8	94.1	44.1	82.0
LME	II	59.6	176.5	41.7	96.6
Copper					
Producer	I	62.9	76.4	50.4	86.3
LME	I	64.1	327.6	45.6	137.6
LME	II	74.5	203.1	57.7	132.4
Lead					
Producer	I	21.4	47.9	13.5	38.0
LME	I	20.3	48.6	10.0	38.9
Producer	II	30.7	140.6	17.7	61.1
LME	II	28.6	167.9	16.0	62.6
Nickel					
Producer	I	183.5	1933.4	128.0	300.0
LME	II	232.0	1764.4	155.8	316.6
Silver					
LME	I	34.7	223.9	13.1	59.3
LME	II	101.8	3247.6	50.2	392.5
Zinc					
NA Producer	I	27.7	88.1	15.0	39.7
EU Producer	I	26.7	80.1	13.8	39.5
LME	I	29.0	239.1	12.4	80.6
NA Producer	II	42.1	25.3	33.1	53.4
EU Producer	II	38.5	18.2	30.4	49.4
LME	II	35.8	18.2	27.1	47.2

TABLE II:

SUMMARY STATISTICS FOR RATES OF CHANGE OF PRICES

Price	Period	Mean	Variance	Minimum	Maximum
Aluminum					
Producer	I	0.906	7.8	-9.2	7.4
Producer	II	-0.061	14.4	-7.4	9.6
LME	II	-0.115	24.8	-11.8	13.3
Copper					
Producer	I	0.233	11.9	-6.8	16.7
LME	I	-0.055	54.1	-24.0	19.4
LME	II	-0.144	31.8	-23.5	16.1
Lead					
Producer	I	0.780	12.8	-20.6	9.6
LME	I	0.909	49.0	-17.8	24.2
Producer	II	-0.293	54.4	-20.1	15.7
LME	II	-0.527	43.0	-21.2	14.4
Nickel					
Producer	I	0.741	9.9	-13.3	14.0
LME	II	-0.530	19.8	-13.9	13.3
Silver					
LME	I	1.804	50.5	-27.4	37.8
LME	II	-0.105	199.5	-49.9	65.1
Zinc					
NA Producer	I	0.725	13.2	-6.9	28.6
EU Producer	I	0.800	12.9	-14.9	11.7
LME	I	0.767	71.9	-25.1	33.0
NA Producer	II	0.246	15.7	-9.7	11.8
EU Producer	II	0.197	13.5	-11.5	10.5
LME	II	0.156	30.0	-15.8	13.7

Our task is to uncover the stylized facts. In particular, we will examine the unconditional mean of $VPCP_{ijt}$ by time period and pricing system. *A priori*, we expect producer prices to be more stable. Because inflation rates were more variable in the 1970s but exchange-rates were more volatile in the 1980s, however, it is not clear what to expect concerning the time-period effect.

Casual observation of Tables I and II leads one to draw two conclusions. First, on average producer prices were more stable than exchange prices. And second, both sets of prices were more volatile in the second time period. It is possible to test these hypotheses statistically. The Mann-Whitney-Wilcoxin (MWW) nonparametric test for a significant difference in two means is used for this purpose.[10] The advantage of a nonparametric test is that its validity does not depend on underlying distributional assumptions. In particular, no appeal is made to large-sample theory.

Table III gives sample averages and test statistics for the two periods. The test is for a difference in the average of the variances of the rates of change of prices (VPCP), where the averages are taken across time periods and across pricing systems.

To see how to interpret this table, consider the test by time period. The first number (29.4) is the average of the period-one variances found in table II, the second number (44.7) is the average of the period-two variances in table II, and the fourth number (88) is the value of the MWW test statistic. Finally, the number denoted "P Value" indicates that the probability of observing a value of the MWW test statistic of 88, if in fact there were no difference in price variability in the two time periods, is 0.10. Alternatively, we can (somewhat loosely) conclude that the probability that price variability was higher in the second period is 0.90.

The second half of table III refers to differences in the variability of prices across the two categories, producer and exchange. This table shows that the chance of observing a value of the MWW test statistic of 63, if in fact the two systems resulted in equally variable prices, is even smaller than that found for time periods. A P value of 0.00 indicates that the probability that producer prices are more stable than exchange prices is virtually one.

Both conjectures are thus verified. We do not know, however, what caused the differences in variability. For example, it is possible that the difference in marketing system is responsible for the observed difference in average variance that the second half of table III confirms. On the other hand, it is also possible that changes in the underlying structural variables which were discussed in section III are responsible for this difference, and that the correlation between pricing system and price instability is spurious.

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[10] For descriptions of the nonparametric tests, see Gibbons (1976).

TABLE III

Tests for Differences in Unconditional Mean Variability

Variability by Period:	
Average Value of VPCP	
Period 1 (1970-79)	29.4
Period 2 (1980-86)	44.7
Test Statistic	88.0 [a)]
P Value	0.10
Variability by Pricing Mechanism:	
Average Value of VPCP	
Producer	16.7
Exchange	57.4
Test Statistic	63.0 [a)]
P Value	0.00**

a) The Mann-Whitney-Wilcoxin test is used.

To investigate this possibility, paired samples are considered. That is, we investigate the six pairs of prices (North American producer and exchange) that exist for a particular commodity in a given time period.[11] The paired samples have two advantages. First, the calculated means are conditional on common demand, supply, and time-period factors. And second, it is now possible to consider differences in price levels across marketing arrangement.

Table IV shows tests for differences in means of the paired samples. The tests make use of the Wilcoxin-signed-rank nonparametric statistic. The first half of the table assesses price levels whereas the second half assesses price variability. We see that it is not possible to reject the hypothesis that price levels are unaffected by marketing method. Price variability, in contrast, is clearly higher when commodities are sold on exchanges.

The fact that price levels are unaffected by marketing arrangement is interesting in itself. Underlying this regularity is the fact that, in periods of high prices, North American producers often ration their customers. An analysis of rationing, however, is beyond the scope of this paper. Those interested in the subject are referred to Slade (1988b).

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[11] The pairs are aluminum II, copper I, lead I and II, and zinc I and II.

TABLE IV

Tests for Differences in Means of Paired Samples

Price Level:	
Average Value of Price	
Producer	40.6
Exchange	39.6
Test Statistic	8.0 [b)]
P Value	.344
Price Variability:	
Average Value of VPCP	
Producer	20.4
Exchange	45.5
Test Statistic	45.5 [b)]
P Value	0.05*

b) The Wilcoxin-Signed-Rank test is used.

The paired-sample tests give strong support to the idea that prices are more volatile on exchanges, even after we account for differences in economic conditions. In a more technical analysis of this question (Slade 1988c), I show that the significant difference in price variability across pricing systems is a very robust result. In particular, this difference does not disappear when other methods of correcting for variations in economic conditions across markets are introduced. This robust result should be contrasted to a similar result for variability across time periods. I also show that the observed temporal increase in price instability is entirely explained by changes in underlying economic conditions.

V Concluding Remarks

An attempt has been made to explain why producer prices have weakened in the last decade and to assess the consequences of increased reliance on metal exchanges. It should be clear by now that the choice of pricing mechanism is determined to a large extent by structural conditions within the industry. It

is therefore a decision that is to some extent outside the hands of the producers.

The last fifteen years have witnessed a decline in the horizontal concentration of all commodity markets considered except for lead and zinc. It is therefore not surprising that these are the industries where the producer price seems to be relatively more viable.[12] In addition, in most metal markets the degree of vertical integration has declined, recycling has gained in importance, and the extent of both international integration and government participation has risen. A combination of these factors will inevitably result in increased reliance on well-organized commodity exchanges.

On average, prices were seen to be more unstable in the 1980s than in the 1970s. This difference, however, can be explained by changes in underlying economic and organizational factors, the most important of these being increased reliance on metal exchanges.

The results for pricing mechanism are very different from those for time period. The most robust conclusion of the statistical analysis is that, even after the changes in market-structure that led to greater price instability have been accounted for, prices determined on metal exchanges are more volatile than those set by producers. Increased price instability in markets that were already noted for chronic gluts and shortages must be considered a drawback.

In spite of this drawback, the switch to exchange-based pricing has many benefits. Perhaps the most important advantage is the introduction of hedging, which provides insurance to both buyer and seller. In addition, the absorption of unwanted inventories must be considered a plus. These highly desirable features of commodity exchanges must therefore be weighed against their substantial costs.

It is perhaps surprising that, in sharp contrast to price *volatility*, the choice of pricing system was found to be unrelated to the *level* of prices. According to the conventional wisdom, prices set by oligopolists should be higher than those determined in auction markets. Producers with market power, however, may find it in their interest to protect consumers from speculative bubbles. If a sharp run-up in price causes consumers to substitute away from metals in favor of commodities with more stable prices, it may be in the long-run interest of oligopolistic firms to insulate their customers from the vagaries of commodity markets.

Because there are costs and benefits associated with any pricing system, it is clear that no one arrangement is ideal for all commodities. The variety of arrangements that currently exists is therefore a virtue and not a flaw. And, as metal markets continue to undergo reorganization, the institutions that govern their prices will continue to evolve.

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[12] Even in the lead market, however, the producer price is substantially weakened.

In the last decade, we have seen fundamental changes in metal pricing. Not only has there been a switch to increased reliance on commodity exchanges, these exchanges have themselves undergone radical reorganization. It is hoped that this descriptive summary and economic assessment of nonferrous-metal pricing as it exists today will serve to clarify some of the issues and decisions that producers and consumers must confront.

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THE LONDON METAL EXCHANGE

Christopher Green

My feeling is that free-market pricing actually works and that although it doesn't work perhaps quite as well as it could - or should - it's a great deal better than any of the alternatives. The LME started in 1877, so it's been going for 111 years, started by merchants in London mainly because they needed to hedge their price risks and because they needed to concentrate on more price transparency than they had had before. So the market was formed primarily to allow those same merchants to discover prices more readily among themselves and to hedge their price risks.

Communications in those days, of course, were extremely poor. Part of the activity was concentrated in London and in Manchester very much more. The tonnages dealt in were a lot smaller, but there was a fair amount of continental activity as well insofar as communications allowed. Of course, the British Empire, which ranged far, had access to the raw material needed to fuel Britain's industry.

Through the telegraph, the same prices which the LME merchants were using in their international transactions and as agents began to be regarded as a reliable basis, given the reputation of the City of London internationally, for transactions in other parts of the world. The actual volume of business that was centred on London was really quite small, a situation which remained very much the case until after the Second World War. There were times of intense activity; for instance, speculative moves such as the activities of groups attempting to raise stock prices during the depression. Certainly, volumes of trade were at times quite high, but broadly speaking, the market was relatively small, the turnovers were not large, and the merchants were very closely involved in quite a lot of other activities as well. Even when I joined the Market in 1958, it functioned only during the official hours; there was virtually no trading in the so-called free market or purse market, and activity was restricted to the so-called rings and to curb.

Change, however, was rapidly underway. The producers during that time, using the London Metal Exchange merchants and brokers as their prime agents, were becoming increasingly dissatisfied with the structure of the LME. They disliked the idea of the tail wagging the dog and they considered that having their industrial operations based upon a market of this sort was quite absurd. I can understand their concern that great industry should be founded on a market with such minor turnover. The London brokers and merchants were not actually helping the producers particularly in this, either. They were lazy in the way in which they did their selling. They did not, in fact, encourage producers in those days to enhance their own terms in the marketplace.

So producer prices became increasingly popular from the early sixties onwards. The first example of this was that of the copper producers. The producer-price system was started by attempting to kill off the London Metal Exchange copper price by producing absolute stability. This, in fact, probably had a significant effect upon substitution because rigid stability of price is probably a bad thing for the flexibility and growth of any industry. The primary fabricators and secondary fabricators faced with rigid price stability find that their competitiveness erodes, especially if the market system is, as it then was, in an overcapacity situation. Indeed, the consensus was that certain of the fabricators were paying more attention to aluminium and the various commodities which the primary producers were anxious to avoid having substituted for copper.

However, in 1964, as is well known, the copper producers introduced their fixed list price at 256 pounds per ton, and the free-market price at this stage, against a reasonably good background, began to rise. The effects of this in the long term for the copper producers turned out to be disastrous. The free-market price rose even higher because the allegedly cheap producer price was not actually reaching the entire marketplace. They thought they had control over the end-users of copper and the customers. They had not. Firstly, they didn't control the scrap market. Secondly, their contracts at these special lower prices which they required their customers under contract arrangements to pass on to their own customers were only available to those which actually had long-term contracts with those producers. All the others, the smaller producers - some of them obviously equally efficient, possibly more efficient than the larger ones - had to seek their supplies on the free market, wherever that happened to be. And, of course, anybody who offered this commodity at lower than free market instantly finds that they have a surprising number of potential buyers, and invariably they are sold out. This was exactly the case with the copper producers.

Thus, while they were totally sold out under their long-term contracts, the sector of the market which they did not reach - hitherto totally dominated by scrap and by the custom smelters and their selling operations in Europe and elsewhere - were also reliant upon scrap which had to be at rather higher prices. The free-market price was driven up considerably higher than it would have been, in my view, had the producers at that time raised their producer price successively to meet the market conditions. But remember, I believe that their intent was to destroy the LME copper price and that their customers would readily accept producer prices in the future. In the event, it was inefficient in the way it distributed metal, it encouraged hoarding and it resulted in the most extraordinary transactions taking place. For example, copper wire bar sold to the Japanese, who were required to pass on the benefits of producer prices, was resold by the Japanese early after its conversion to the form of rod, but it was sold through an intermediary to a major

Swedish concern which bought the rod, chopped it up into small pieces and brought it into their custom shop to make billets. This was an example of a distortion of delivery of material not being used for the purpose for which it was required. Likewise, Manika, a small company in Chile, was obviously able to demand that its capacity requirements should be fully met by the Chilean suppliers and it had an active time putting wire bar through the rolling mill under one or two passes, then shipping them out straightaway at a highly inflated producer price to Rotterdam where somebody else chopped them up into small pieces and sold them for scrap.

So producer-pricing was inefficient. It came to an end after about two and a half years, and the producers reverted to the LME price for copper. Considerable damage had been done in the meantime, mainly that further exploration and investment had been excited by higher LME prices. This, in fact, continued throughout that particular period. It didn't do the producers any good in the long run. In my view, the producers suffered, probably for the next ten to twelve years, albeit to a marginal extent, by the very policies which they had introduced.

This, however, did not deter the zinc producers from launching their own producer price in 1964. They had a very much better chance of success. Firstly, they had a very strong scrap factor and, secondly, they did control a great deal more of the market through the strong association which they had developed with the custom smelters. Intrinsically, the zinc trade is very different than copper. Copper has a prime international trade in shape with the wire bar, and zinc is in concentrate.

Besides this powerfully developed relationship with custom smelters, there were interlocking interests as well. As a result they were able to maintain their producer-price system until recently. Nevertheless, they have not been able to maintain total control over the marketplace. They made serious mistakes in the mid-70s by adopting a low producer-price basis in relation to the free market and, in turn, they excited not only substitution away from zinc to a greater extent than otherwise would have been the case, but also stimulated more production which they were determined that they would control. Zinc prices rose, I believe, to a maximum producer price of about 360 pounds per ton when the LME price, admittedly operating only for marginal tonnages, went up to 800 or 900 pounds a ton. However, the free-market price had a high profile and was excited by the low prices which led in turn to hoarding and to those who were reasonably well-supplied by the zinc producers actually buying additional marginal amounts when the market was ill-equipped to provide that sort of supply.

In the sixties, there was no LME price for nickel. Inco, who had been responsible for developing nickel markets and promoting its development, dominated supply - indeed, Canada dominated the market and they thought that they were the market. They maintained their price at a relatively low

level which they thought was a fair market price, which gave them a good profit and, as far as they were concerned, would guarantee end-use for the future. However, they were not able to meet the demand. The free-market price (without the LME) rose to the staggering heights of over 7000 pounds a ton. That very high free-market price, without there being an LME price indicator (an LME price indicator gives a forward indication as well), certainly excited a lot of development into production that was not as profitable and has dogged that industry with overcapacity until very recent years. The damage caused by the producer philosophy at that time was not overcome for perhaps 15 years.

The moral of this is that while producer prices have been at times higher than the free-market, a producer price which is higher is inevitably discounted. It becomes a reference point and it leads to discounting by means of either a direct discount in certain cases, delivery allowances, delayed payment, consumer stocks being financed by the producer, and all the other mechanisms which will bring a producer price nearer into line with the free-market price. Moreover, it tends to be upset by the ability of producers or agents to prove the old story that producer cartels break down because they prefer to cheat each other rather than their customers. It's relatively easy in certain cases for tolling arrangements to be adopted, as in concentrate supplies which remove the responsibility for the custom smelters from having to discount the metal themselves. They allow the merchants to buy concentrate from cheating producers, transpose it and this in turn ends up as metal.

When the producer price is high, it is discounted to bring it down nearer to the levels of the free market price. This is nothing like so dangerous as the problems which arise when the producer price is lower than the free market. In other words, where a producer thinks he is doing his customer a favour, he is in all probability doing himself more harm than good in the long run.

During these periods of time, the LME has continued to be active, especially when the markets have been undersupplied. Especially in the market for copper and zinc where the LME is important, price volatility has actually been enhanced and exaggerated by producers maintaining artificially low producer prices. This factor is singularly important. Producers, for many years, complained of the volatility of the LME, despite the fact that in many cases it was their own policies that contributed in large measure to that volatility. After all, terminal markets such as the LME are marginal. To the extent that there is no producer involvement or activity in those low prices, and indeed there is producer involvement in charging prices at other levels than the LME, so that marginal volatility is further excited. This has led to these broad principles of the volatility of the markets.

Producer attitudes towards the free market, towards terminal markets such as the LME, are now rapidly changing and in certain cases have changed totally. Where producers have accepted the free market as their basis in their

price-setting policies, they have effectively embraced the LME as the only effective method of pricing internationally. The exception is COMEX in North America, but the LME holds sway everywhere else, including transactions between eastern Europe and the west. However, in their adoption of LME pricing, the producers have to a large extent ignored the actual mechanism of the market. Indeed, in my view, their activities have encouraged low prices when the market has been in oversupply and, in a curious way, have actually supported yet higher prices when the market has been too tight.

To illustrate, in the period immediately after 1973-74, copper prices rose very fast indeed, not because of any sound underlying industrial background but largely because of speculation and because of the oil price explosion. After that period, the producers were in a position of oversupply; their production was excessive and consumption had declined, but they persisted in granting to their customers what they wanted without query as to what effect this might be having in the free market. Thus it was relatively easy for any consumer who was at all sophisticated to buy on term contract from a producer with his pricing basis being the month prior to the month of shipment in a contango market and, indeed, even two months prior to the market shipment. The advance pricing under the term contract allowed consumers to buy at the cash price material which they were not going to receive for at least another month or even two. A contango market aroused the consumer to hedge-sell into the market and hedge-sell they did, in very large volume. The merchants followed suit, and their activities in paying the producers even higher premiums for marginal tonnages perhaps alerted the producers to what was going on. Producers realized that they were going to have to charge their customers increasing premiums for the facilities they were offering. Whilst they continued to give advance-pricing periods, they were encouraging the consumers, in particular the first-stage fabricators, and merchants, to hedge-sell into the market and thus actually depress the price even further than would have been the case. This was not countered by any buying by the producers. With only a few exceptions, they were signally absent from the market. There were very few examples of producer activity to invest in material, either during 1973-74 when prices were very high or in the subsequent high-price periods of 1976-78.

So advance pricing led to hedge-selling in the market, a price depressant, and stocks, moreover, followed suit. Because so many warehouses at the time were located only in Europe, that was where the stocks were most depressed. I'll come to that later as another feature of the change that is taking place in the LME.

This advance pricing was also prevalent in other metals, too, and when, relatively recently, for the first time, we've seen a change in market structure and a boom in metal prices, one signal thing has occurred. In 1987, the producers still insisted that their customers buy on the basis of the month of

shipment. In a backwardation market, when cash price is high, the customer is then forced to buy at the cash price a shipment which he will not receive for a further month perhaps. He is effectively forced because his own customers are declining to buy at the cash price for the period which they need, in say two months' time. The first-stage fabricators, in these particular cases, were forced into a position of either hedge-selling into a backwardation market or going long with the market. In fact, most of them went long of the market, declining to hedge-sell in a backwardation market. Here's a case where producers, perhaps being aware of what they were forcing their customers to do, declined to do anything about it, either because they feared that they might lose the average which the LME price had attained over the period and thus have to answer to their shareholders or their government as to why they had failed to at least attain the LME average. In many cases, however, I don't believe they actually understood what they were doing to their customers nor, perhaps, what they were doing to the market at the same time.

Now, a parallel activity was taking place during the second half of 1987. Whilst many of the fabricators were being forced into going longer and longer of the market in order to avoid the problems of backwardation, so many producers were taking advantage of what they saw to be the first real significant increase in base prices for some time, and extensive hedge-selling was undertaken in the market during 1987, peaking during the middle of the year and going on for some months afterwards. It was by no means clear to LME members what was taking place. Certainly the producers had no idea of the extent to which other producers were doing the same thing. There were some producers who did not do any of this.

As the market then proceeded to do the opposite of what the forecasters were saying and, in fact, showed underlying strength and got stronger and stronger, so these producers reversed their positions, buying them back. They took a loss in the free market, but benefited from the increased price in the sale of many of their unhedged contracts. In many cases they had to borrow back into the marketplace. As they borrowed, they widened the backwardation.

Here I have given two examples of producer activity. On the one hand, during a period of marginal oversupply where they actually encouraged their customers to be hedge-sellers in the market, and another case when the market was strong but they were encouraging their customers to be buyers in the marketplace rather than simply maintaining their positions.

I believe that, on balance, producers should be not encouraging their customers to be hedge-sellers - they should, in fact, be encouraging their customers to be hedge-buyers. The emphasis is on the word "hedge", not to be speculatively involved in the market which was where they had forced them to be up until the end of last year. By the time we got to the beginning of 1988, the producers were now responding to the excited demands of their

customers to change their pricing periods to later, to a time when the cash prices they would pay would be more in line with the price at the time when the metal was actually going for consumption. This is now taking place, but not without producing some enormously volatile swings in the marketplace. I attribute much of this to producers not actually understanding the needs of their customers or, if they did, then deliberately avoiding granting them what they needed.

This brings me to aluminium where we have a different market structure which has been entirely reshaped since the oil crisis in 1973-74. The Japanese have been very quick to virtually eliminate their smelting capacity which has left Japan with quite a strong domestic processing industry in aluminium. The aluminium producers themselves have gradually lost control of their markets through the introduction of new smelting plant in countries where there was relatively cheap power. Having lost control of the market and dropped their producer price, producers have been using the LME as a reference price point. Internationally, the LME is now used a reference point for a tremendous range of transactions, but it is not used for anything like the volume it should be, or the volume it is capable of dealing with, as it is in copper.

The aluminium producers themselves were active in the latter part of 1987 in hedge-selling into a market which then was high and attractive. They could calculate their profit, sell into the market to set a lock on prices, just in case. These same aluminium producers, in a period of high demand, were of course having to supply the actual figures when the time came to their customers, so that their LME hedges had to be bought back or borrowed in the marketplace. This in turn has further exacerbated the price volatility of the market, partly because these aluminium producers undertook their hedge-selling operations too soon.

I don't want to criticize their activities because many producers undertook it because it seemed a good idea at the time. The mistake may be in timing, but one cannot gainsay their right to carry out such operations, especially when there was a clear benefit at the time for them to do so. But nonetheless, the activity of either buying back or borrowing these (at times) substantial holdings, sold into the marketplace, had its effect in turn in price volatility on the LME.

This brings me to zinc. The zinc producer price has lasted for 12 years, although in the last 6 or 7 years it has increasingly reflected LME values and has closely followed the patterns of its movements. It has been unsatisfactory in that it has not permitted the custom-smelting trade or the narrower parts of the consuming industry to conduct hedge-selling or hedge-buying operations with any confidence. It is resulting in other unsatisfactory ingredients of the producer price such that the LME price will almost certainly be used in 1988 for all transactions. A special High Grade contract has been introduced on the LME to reflect prevalent quality standards. It seems that the zinc con-

centrate producers will now revert entirely to the LME. Now in the process of doing so, what I sincerely hope that they will do is actually structure their prices for the zinc in concentrate at the time the zinc metal is available out of the refineries. Of course, the zinc producers themselves should be selling their own products on the basis of the average quotations during the month for delivery of the metal. So that where producers are selling their metal in concentrates, they should not be giving advance prices beyond the month of delivery; in other words, the reverse of contango advantage or backwardation. They should, in my view, be structuring their prices, not only in copper and zinc but also aluminium, into pricing during actual periods of delivery. To do otherwise is to contribute to the price volatility of which they complain.

The LME's position in all of this is as a pricing catalyst. We're a relatively small part of the terminal market but I think we're an important part. What the LME has been trying to do over the last five years is to improve its contracts and its ability to respond to the marketplace as a whole so that it will better reflect actual free-market conditions and thus be able to provide a better service for all producers, fabricators, and merchants whose involvement in the actual markets should be improved. If producers are using the market as their pricing mechanism in the way that I have described, they themselves are free to conduct their activities using the free market which can provide all the mechanisms that they need to provide the services which their customers want.

There is certainly a need for producers not only to use the LME as a pricing basis but also to use the market themselves to further their own interests. Whether it is a simple process of hedge-selling when prices are really high (not when they're only reasonably high), but also in their own selling operations to be to their own assistance and that of their colleagues, actual hedge-buyers in the market when perhaps prices are not so good. When they come to buy, fixed-price opportunities and lock-in price opportunities can be very helpful.

The LME has been doing a number of things, including upgrading its contracts, to better reflect what is actually produced internationally. We did this for copper some years ago and we still need to go a little further in that direction. We've done it in aluminium by eliminating the standard contract and raising the quality. We've now done this in zinc and we will possibly be looking at lead to see whether that can be improved in some way. Nickel presents rather more of a problem because of the very wide number of forms in which it is being sold.

The other important point is that we have to improve our warehouse and delivery system. For years, until 1963-64, the only LME warehouse delivery points were in the U.K. Since then, we've spread throughout Europe. Now the LME membership is international; its contracts are internationally accepted as a pricing basis, and its clientele has over time become increasingly

international as communications have expanded and as exchange controls, which were anathema to any free market, have been eliminated. The one thing which has not taken place has been the spread of warehouse delivery internationally. In the last year we've made great strides: we introduced Singapore as a warehouse delivery point, which effectively took the solely European image away from the LME. This is now an active warehouse delivery point, at least giving some service to Asian cities and countries. Japan will become a delivery point for aluminium only in July of 1989 and will be an enormous help in assisting the reduction of price volatility in the market, especially in the few periods of stress during backwardation, by allowing metal to be delivered promptly.

A network of warehouse delivery points is a necessary accompaniment not just to LME prices which will be recognized not only as a reasonable basis for sales or hedging purposes or proper producer utilization, but also to allow a market response which is far faster and far more accurate than it has been hitherto. The LME will avoid situations like in 1978 when we had a copper stock of 630,000 tons or so in LME warehouses in Europe. If we'd had some an international system of warehouses, those high stock levels in Europe would have been spread internationally much wider than they were and would not have seemed so great even if there had been that much in stock. After all, nobody actually delivers metal into an LME warehouse unless they absolutely have to. It is, after all, a delivery point of last resort.

Finally, it seems to me that producers are beginning wholeheartedly to adopt the LME, not only as their pricing basis, but in perhaps a way in that utilizes the market in a way that will work not only to their advantage but to the advantage of their customers and to the advantage of the market as a whole. I believe that this is an excellent trend (I'm bound to say that, am I not?), but I believe that it is our duty as an exchange to make that process more effective and to do everything we can to educate all the different users of the exchange to use the market effectively. This will be particularly important in zinc, whose consumers have been away from the exchange for 25 years and the battle is against ignorance. I believe that in overcoming this, we shall see a very large improvement, not only in the use of the exchange, but also in its ability to reflect less volatility and provide a more accurate pattern for the free-market price.

THE ROLE OF TERMINAL MARKETS

Robin Bhar

The past ten to fifteen years have been marked by significant changes in the global economic system: volatile foreign exchange rates, fluctuations in interest rates and inflation, industrialisation of the Third World and shifts in international trading patterns, to name but a few. This has heralded an increased complex-ity to the world economy and international trade, none more so than in the metal markets, which have become more competitive and more international in outlook. The result has been the weakening of the traditional producer-pricing system.

During this period, the terminal markets or futures markets in metals have grown rapidly to become a dominant influence in metals trading and pricing.

There are six main reasons why producers have lost, and will continue to lose, their dominance to the futures markets in metals pricing negotiations.

1. Horizontal concentration of all metal markets has declined, and there has been an increase in competition, e.g. the aluminium industry.

2. The degree of vertical integration has declined.

3. Recycling is now a very important component of total supply.

4. There are more international integration and government participation.

5. Commodity Exchanges have emerged and hedging is widely used.

6. Influential metal merchants have emerged.

It has been estimated that, in order for a recognised producer price to be declared, it must be possible to control the market to the degree neces-sary to establish such a price - believed to require control of over 85% of available production. This is still true for molybdenum but increasingly less so for metals like copper, aluminium, lead and nickel, where the secondary sector is significant, approaching up to 50 percent of total supply in some cases.

Let us take copper as an example. The copper market has become more competitive with the entry of Third World producers, many of which are much less integrated than their Western counterparts. Additionally, US mining companies have sold off their fabricating facilities; concentrates are sold

increasingly on the open market or are sold to smelters in countries other than that of origin; and scrap is an important source of supply. Thus outside North America, all the copper is priced on the basis of an exchange-established price. In North America, the traditional producer price has virtually taken second place to exchange-based prices, with the majority of producers now having gone over to a COMEX-based price. Similar trends are apparent in the aluminium, nickel, lead and zinc markets.

Historically, mining companies and metal producers have been op-posed to terminal markets because of their perception that such markets es-tablish their prices outside the control of producers. However, terminal mar-kets do not establish prices; they simply make visible the prices at which business is being done. The true level of prices is a function of supply, demand and inventory, and the visibility of prices through a terminal market and their trends is the best indicator of supply deficiency, adequacy or excess. These prices are used as the basis of many contracts in the metal trade.

The London Metal Exchange (LME) is the only market where hedging transactions can be accurately related to physical trading. Consequently, the exchange continues to attract increasing volumes of such business from all over the world, which in turn enhances its credibility as a pricing medium. Furthermore, many of the world's producers now utilise the LME, as LME official settlement prices set their selling prices. There is also the realization that to effectively compete in today's marketplace active participation in a terminal market is vital and allows producers to have some influence over prices. Producers ignore these markets at their peril!

There are other important reasons why producers, merchants, proces-sors and consumers should use a terminal market:

1) It allows them to acquire better knowledge of the market and its workings.

2) It provides access to high-quality, timely information on market forces; therefore, they know in advance of any deficiencies of supply or demand by, say, the Soviet Union.

3) It increases the visibility of supply management needs.

4) It gives an understanding of the disciplines needed to enhance prices, rather than diminish them.

Thus, an important role for a terminal market is to permit the metal trade, through their activity in the market, to have some influence over prices. The fact that they are participating along with other buyers and sellers gives them some influence over prices. In a sense, the terminal market is to act as

a clearing house for the various forces in the market leading to price levels used for the transfer of commodities from the raw state through to finished products.

Another equally important role of a terminal market is the ability to have a transparent and visible price daily reflecting transactions between many buyers and sellers from around the world and establishing the transfer price for metal units moving from ore through to finished products. Futures markets or terminal markets are thus a very efficient means of price discovery. The ability to utilize quotations in such markets on a forward basis to protect against risk is a further value of the market.

Terminal markets have proved responsive to the changing needs and structure of the marketplace and the trend toward the increasing globalization of metal markets by introducing new futures and options contracts and other facilities. Many of the important innovations on the LME have come about due to the wishes of producers and also reflect changes in cash markets. It is to the credit of the LME that they have introduced the contract quickly to allow producers to hedge their trades. Recent innovations include the launch of a new high-grade copper contract on COMEX, and on the LME:

- high-grade aluminium contract;
- special high-grade (SHG) zinc contract;
- clearing system;
- extension of trading from three months to fifteen months (cash may be traded on a daily basis);
- traded options contracts;
- US$ clearing in all six metals;
- listing of the first far eastern warehouse in Singapore;
- moves toward the setting up of warehouses in Japan and the US.

The traded options contracts are a logical extension, and clearing in US dollars goes some way towards better use of the market. All in all, these initia-tives have resulted in increased participation and use by producers. Turnover on the LME is now in the range of 70 to 80 million tons; the results include a reduction of spiking markets and a rise in the preeminence of terminal markets.

These changes and the continuing close dialogue between the terminal markets and the metal trade will ensure that terminal markets remain a dominant influence on pricing and that their role becomes even more important in the years ahead.

THE ROLE OF TRADE ASSOCIATIONS

William H. Dresher

Introduction

Unfortunately, since minerals are commodities, marketing and the importance of marketing are often poorly understood in this industry. For this reason I believe that this symposium will help to highlight the importance of marketing in the functioning of the mineral industry in Canada as well as elsewhere.

Mineral Commodity Marketing

The marketing of a mineral commodity is a complex activity. There are the primary markets - those who directly use the commodity, and there are the terminal markets - the commodity exchanges where the commodity is brokered. The latter often involve more paper transaction than the physical movement of the commodity. Therefore, the sales conditions established by the terminal markets may not reflect the actual flow of physical goods. Since mineral commodities are raw materials, they enter into the manufacture of a vast number of end-use goods. Further, there is generally a succession of intermediate manufacturers in the product chain between the mining company and the end-use consumer. In copper, there is a semis fabricator (a wire mill or a brass mill) and at least one manufacturing company. In a product like automobile radiators, for example, there are two manufacturing companies after the semis fabricator - the radiator manufacturer and the car manufacturer. Because of these conditions, a copper company generally does not know the actual end-use market in which his product plays a role. Nor is it necessarily aware of the market forces that influence the sale of the end-use products containing its product.

Further, while companies within an industry may vie against each other for orders through the use of promotional activities such as advertising, *their efforts are not contributing to the general expansion of the use of the commodity they are selling* because their promotional activity is not aimed at the ultimate decision-maker! In other words, because of the nature of the business, a mining company's sales efforts are mainly directed to increasing the *market share* for their company. They are not necessarily directed to the overall *expansion of the market* itself. As I will mention in a few minutes, aluminum differs from this pattern.

To understand the value of promotion, or market development in general, one has to understand what controls the value the producer of the commodity

receives when he sells his product. Previous speakers have addressed the role of the terminal markets in the trading of a mineral commodity. It is important to realize that the conditions of sale established by the exchange are controlled by the *marginal* sales of the commodity, not by the vast majority of the sales! In copper, for example, more often than not it is the last 5 to 10 percent that is sold that determines the selling conditions for the remaining 90 to 95 percent! Thus, *the real mission of market promotion in a commodity industry is to attempt to influence that last increment of demand for the product.* By doing so, the promotional activity is expected to have a positive impact on the health of the industry. Because this is an industry-wide activity, market promotion activities in a commodity good are generally delegated to a trade association.

The exception to the use of a trade association for market development is when there is little competition in an industry. When the International Nickel Company, for example, controlled 80 percent of the market for nickel, and it only had two or three major competitors, it essentially performed all of the generic nickel promotional activities for the industry. However, when that market share dropped to 30 percent, and there were several dozen competitors, INCO abandoned its activities and assisted in the formation of the Nickel Development Institute - a trade association established for the promotion of nickel on a global basis.

Another exception worth mentioning is the case of the aluminum industry. While aluminum is a commodity, and today it too is traded on the exchanges, the industry that produces it is generally considered to be integrated relative to such industries as copper, lead and zinc. The companies comprising the aluminum industry traditionally have performed their own product R&D and product promotion. They then have used these activities as a means of competing with one another. Thus, while the aluminum companies conduct their promotion activities in order to improve their respective market shares, the nature of their industry is such that these same activities become demand-building as well. As a consequence, the entire industry benefits from the individual company activities of this industry.

Trade Associations

Before continuing with the marketing train of thought, let's stop and discuss what a trade association is. Probably the best definition is a functional definition:

> A trade association is a legal entity which enables competitors to legally and collectively accomplish a purpose which is for the general good of the industry.

In most countries the majority of a trade association's activities must be for the collective good of the industry, and not just for that segment of the industry which are members. The legal bases of a trade association are contained in antitrust law and in tax law. The latter is important because it is desirable in most cases to have the organization be a non-profit organization and therefore exempt from taxes. Trade associations are formed, and companies join them, because the association provides a service which the individuals either cannot perform for themselves or it is not feasible, economically, etc., for them to do so. They are based on a mutual self-interest of the members. However, they are not intended to create a competitive advantage for their members or any group of members. Member companies must act independently of the trade association for this purpose. Nonetheless, trade association members expect a profitable return as a result of the association's activities.

Trade associations perform one or more of a number of types of services for their members. Among those generally recognized are:

- Presenting industry's position to government.

- Keeping the members informed of new developments in the industry, in government, in society, etc.

- Providing a forum to meet vendors, customers, or competitors to discuss mutual problems.

- Setting industry standards.

- Forecasting future problems to be faced by the industry.

- Providing continuing education.

- Maintaining good relations between industry and the public.

- Promoting public image or public information about an industry or a product.

- Maintaining good relations with customers and suppliers.

- Performing research and development.

Returning to the marketing context, it is illegal in the United States, and I presume in most industrialized countries, to participate in the sales aspect

of marketing in a trade association. Other formats exist for this purpose. Thus *the role of a trade association in marketing is in the promotion aspect of marketing.* In this case, the promotion must be of the generic product and not of that of the specific companies who are its members.

I listed earlier the various types of services that a trade association provides its members and I did this for a purpose. This list was used by Gallup, in a questionnaire to the senior executives of 538 companies, to determine their perception as to the effectiveness of trade associations in performing the various types of services for their members. The poll revealed that those services which are closest to the market development activities; i.e., promoting public image, maintaining good relations between industry and the public and R&D, were the functions that ranked the poorest in the minds of the executives polled! Thus, any trade association involved in new product development and market promotion, from basic principals, has its work cut out for it in gaining and maintaining the confidence of its members! In spite of this, there are a number of very effective trade associations operating in the promotional mode. Stellar among them, in our opinion, is the International Wool Secretariat. This is a London-based organization with offices in most of the wool-consuming countries of the world. It is this organization which places the "Woolmark" in the woollen goods you buy. The IWS has an annual budget on the order of $130 million (US) per year and has its own research laboratories with a budget on the order of $25 million (US) per year. In contrast, the copper industry's world-wide budget for market development, including R&D, is on the order of $10 million (US) per year. The most notable of the measures of success of the IWS is the fact that the consumption of wool has actually increased in the face of the introduction of lower cost synthetic fibres. In so far as R&D in an association is concerned, cooperative research is the "new look" in the United States since the passage of the National Cooperative Research Act of 1984. Unfortunately, it has been the value-added-oriented high-tech industries, such as electronics, who have taken advantage of this new initiative rather than the volume-oriented mineral commodity companies.

Trade Associations and Market Promotion

Let's now look at the role of a trade association in market promotion in more detail, through the activities of the Copper Development Association Inc. and my own organization, INCRA. In the general area of promotion we consider three categories of objective:

- protection of an existing market;
- expansion of an existing market;
- creation of a new market.

In the second category, expansion of an existing market, there are two sub-categories:

- increase of market share in a given market region;
- extension to a new market region.

It is these categories that determine the functions, or suite of functions, that are used in undertaking a promotional project.

The functions, or tools, used in market promotion of a commodity are many and varied:

- Market Development
  - demonstration and trial use of products in both old and new applications.

- Advertisement
  - image-building for the industry or for its product.
  - specific to a product and/or an application.

- Technical Service
  - response to questions from consumers.
  - providing consulting services.
  - maintenance of data bases of technical and design information.
  - presenting training seminars.

- Market Research
  - survey of current status and dynamics of end-use markets.
  - analysis of information.
  - reporting to members.

- Market Intelligence
  - the determination of social, technical, economic, environmental and political (STEEP) factors influencing demand.
  - analysis of trends in competing products.
  - analysis of trends in technology developments.

- Research and Development
  - technical surveys.
  - basic and applied research pertaining to the product and its applications in end-use markets.
  - new product development.

One organization may participate in all of these activities or in just a narrow range of activities. In nickel, it is one organization that operates worldwide - the Nickel Development Institute, located in Toronto. In copper, there are nineteen national and regional organizations which serve the role of a local centre for copper information and promotion activity in the various copper-consuming regions of the world. In Canada, the organization is the Canadian Copper and Brass Development Association which is located in Toronto. In the United States, the organization is the Copper Development Association, which is located in Greenwich, Connecticut. In West Germany, it is the Deutsches Kupfer Institut, etc. The product-oriented R&D for the industry is conducted by my organization, the International Copper Research Association, or INCRA as it is commonly known, which has offices in New York and Potters Bar, England. As such, INCRA works with all of the centres in using R&D to assist in the overall mission of improving the demand for copper.

Effectiveness

In view of what seems to be a universal feeling that a trade association is not particularly cut-out for market development activities, let's turn now to looking at some of the factors that determine the effectiveness of a trade association in performing this role. From our observations, there are a number of factors that control how effectively a trade association is in the job it performs for its members. The first criterion, and for copper the most difficult one, is that the members should represent a majority of production in their sector. It seems that there is a general lethargy and doubt that a trade association can be effective in our industry. The benefits of promotion and R&D are hard to justify to an executive whose own performance is measured in terms of tons of ore delivered above ground per shift or in terms of the bottom line of an O&R statement. As a result, over the years, our promotional organizations have been up and down in gaining and retaining membership. Thus, membership matters occupy a major percentage of the time of the executive staff of these organizations.

In so far as the program of the association itself is concerned:

- The aim of the program must be clearly identified and achievable.

- The perceived return must be sufficiently attractive to justify the committed involvement of the members.

- The association must have good market intelligence and use it to guide its decision-making and program justification.

- An activity must be carried on long enough for its results to be evident.

- The activities of the association must be focused in order to provide a level of support above that which is considered to be critical for each activity.

Generally, cooperative programs require a longer time to implement and to see fruition than those of an individual company. This is because group decisions tend to be less focused than individual decisions. Thus, an important role of association management is to help to expedite group decision-making in order to provide both a high-quality decision-making process and high-quality decisions emanating from the process.

The key to effective promotion of a commodity good is to convince the person who specifies the use of a material of the value of your product relative to the alternatives he has at his disposal. The difficulty in most cases, lies in determining who the specifier is. He may be:

- an engineer, a designer, an architect;
- an end-use consumer (a housewife, for example);
- a manufacturer;
- a supplier to a manufacturer;

and, in the case of codes and standards,

- a government official;
- an insurance company.

Thus, a promotional activity must be carefully tailored to be directed to a specific clientele. This clientele may be different for each activity in the program. Again, a "scatter-shot" program is ineffective and not cost-effective in achieving the goals desired.

Conclusion

The mission of a trade association in the promotion of a commodity product is not an easy one; however, it is an indispensable mission to an industry like copper. The copper industry is currently considering the reorganization of its cooperative market development and R&D organizations. All of us involved hope that this reorganization will provide a fresh start for our industry.

Hopefully, out of it the true role of trade associations in promoting a commodity like copper will become apparent to our industry.

THE INTELLECT OF RESOURCE MARKETING

Or the How and the Why We Do it at Noranda Sales

William Deeks

Introduction to Noranda Sales

When Peter Richardson first asked me to talk to you at this conference many months ago about the way a mining and metallurgical processing company should organize a marketing group for its products in international markets, I thought that would be a piece of cake, because all I would have to do is talk to you about the way we run Noranda Sales.

That is not to say that the way we run Noranda Sales approaches perfection but it is to say that we think a great deal about the question Peter asked me to address, so perhaps if you knew how we do it, it would be helpful to others facing the same challenge. But since Peter asked me, a number of interesting things have happened, not the least of which is that within Noranda Minerals a group of Strategic Thrusts were developed for the decade of the 1990s and one of these is a Strategic Thrust on Markets.

Noranda Sales, with the marketing responsibility for Noranda Minerals, then started a process of thinking through what the market initiatives for the decade of the 90s should be. This led to an Arthur Young/Woods Gordon--sponsored program called "Focus", to determine what Noranda Minerals' strategic thrust on markets in the decade of the 90s should be and therefore just what the organization, operation, and management of Noranda Sales should be.

So while I could tell you about what we have tried to be in the past, that might not be terribly relevant to what we should be doing in the future.

So I am going to dream a bit and perhaps hope a bit and tell you what I think a marketing group for a mining and metals enterprise focused on world markets should be in the decade of the 90s. There are a number of characteristics about the 90s that I think we should establish as assumptions.

Noranda People Quality

First of all, to the extent that we have felt in the past that an effective commercial group must always start with very high-quality people, this clearly will be the need in the decade of the 90s.

In a world of accelerating change and high customer responsiveness, good intellect, high motivation, superb presence and truly knowing the right costume on the right stage to make customers happy will be a strong requirement.

It will be no period for slouches or others not really striving for excellence, so this tells us that the continuing search for very high-quality people will assume even greater significance than it has in the past.

People Hiring

Now at Noranda Sales, we take a great deal of time in the search for and hiring of new entrants. That may be partly because a number of us graduated from Procter & Gamble. But it is clearly because we know that the process we follow does produce truly good Noranda business people who have the capability to become highly qualified international commercial officers. We believe the process has something to do with it.

Now what is the process?

First of all, we put recruiting teams into several universities at the right time of the year, usually November, to brief prospective applicants on the company and its objectives. We stress the need for good intellect, high energy, willingness to travel, the reality of a 70-hour work week, the belief in reward for performance, and overall, the expectation that we offer an outstanding international business opportunity for young Canadians of ability.

As a Canadian company, we want to have a Canadian identity in the international market but at the same time we want our Canadian environment to be conditioned for those markets. So a number of our people come to us from other lands or start working in our enterprise in one of our offices abroad. But it is imperative that they all understand that they represent a Canadian mining and metal-processing company, proud of its heritage and committed to a global village.

Eighty percent of our business is outside Canada.

The interview teams at the universities select the students most interested in employment at Noranda Sales. A short list of candidates is selected for further interviewing. These candidates come to Toronto and go through a process of up to ten interviews with a cross-section of people working for the Sales Corporation, for two purposes:

- The first purpose is to give the candidate a really thorough understanding of the working environment, the calibre of people in the business, the personal views of those people on what working at Noranda is all about, and overall, a sense of the type of environment we offer from a variety of sources.

- The second purpose is, of course, for the people of Noranda Sales to look at the potential applicant and to assess whether in their view that person could make a worthy member of the team.

Each interviewer assesses the interviewees and provides a written summary of impressions under a series of flexible headings which will include deportment, personality, knowledge of the business, desire to work for Noranda, debating skills, motivation, questioning capability, quality of answers, and generally some sense of how the candidate would look to the kind of people Noranda does business with.

One of the things we hear about from the people we do business with is the quality of our people and their consistency with respect to our policies and practices. This is always good news to me because this is what we are striving for. An entrant must understand this absolute requirement in business conduct.

The other requirement for a candidate seeking entrance to Noranda Sales' employment is the desire of a manager needing a position filled to be committed to the candidate. For example, while I ultimately approve all candidates to be hired by the company through an interview with the candidate, I hire no one. The hiring is done by a manager who has identified that a particular individual will meet the requirements of the job and be a good member of that manager's team.

The qualitative part of my job in this process is to confirm in my mind that the individual recommended for employment fits the description of the interviewers while, at the same time, wanting the candidate to know a bit about the President and his attitudes, as most Presidents have a dominant influence on an enterprise and if one does not like the President or his influence, then it probably is not a good place to work! The reality, of course, is that it is easier, although not impossible, for the President to terminate misfits rather than for the misfits to terminate the President!

Noranda People Training

Once hired, a new professional employee enters into a two-year apprentice period during which there will be an exposure to a specific business discipline with a relatively high level of delegated responsibility along with a lot of detail work designed to help an individual really learn the business. Sometimes people think that this early period is demeaning relative to their highly advanced skills from the university environment. The ultimate test of this experience is some years later when one's detailed knowledge of how things really work can be immensely helpful in dealing with problems or with people whose perceptions of their job are simply out of line.

Progress is reviewed every six months, when salary changes may take place. At the end of two years, there is a serious discussion about the progress of the individual and the suitability for both the company and the individual in a partnership for the future.

In recent years most of our new employees who have passed through this two-year stage have become career Noranda people; they build a responsible commitment not only to the commercial affairs of the company but often to other activities into which they spring from their commercial base and training.

Now in a world that has changed from a production-driven environment where people would generally take what you offered and be glad to do it, into a world where people are demanding and particular about what you offer, the principal objective we have with our commercial people is:

- to train and develop individuals who start by being very good business people;

- who have the capacity to be comfortable in and cross many cultures in a world market;

- who are good teachers and can bring up to speed all the people on their molecule about the realities of the commercial environment;

- who will build impeccably good relationships with the other disciplines in the business and especially those people in production who produce our products;

- who can maintain harmonious and friendly relationships in the customer environment and, in fact, with all other people impacting on our business;

- and finally are mature, sensible, ethical, honest Noranda people truly understanding their role on the team.

That may sound to you as pretty idealistic stuff.

It probably is, but I can tell you that if you don't believe it and don't say it, it will never happen.

Noranda people - Noranda Sales and Walt Disney

In this sense, our creed is from Walt Disney and the approach that Walt Disney takes to the training and development of people who make Disneyland such a superb place for the Walt Disney customer.

This credo establishes the fact that Walt Disney people are on stage when they meet the customer, they must be all smiles and in the right costume, and they must conduct themselves in a manner that deals with customer needs and assures the return of the customer to do business another day.

Let me quote to you what Noranda's Panorama said in a recent profile on Noranda Sales and, I would add, without any prompting from me!

> Picture this. You're strolling down Main Street, U.S.A. to Town Square. The street is bustling with people, happy people, sight-seeing. Shopping. Exchanging smiles, greetings, handshakes. Moms, dads and kids alike are bright with enthusiasm as Mickey waves hello! This is the happiest place on earth! It's Disneyland.
>
> If you've been there, you'll know the feeling, you'll be smiling even now. It is a happy place. It's the kind of place you don't ever want to leave. And most people go back.
>
> What does all of this have to do with Noranda Sales?
>
> Simple.
>
> It's a philosophy. The Walt Disney belief that when Disneyland employees are on stage in the right costume, they must be anxious to make the customers happy - to make sure they come back to Disneyland.
>
> And that's part of our philosophy as well. We want our customers to come back, happy with our products and service, happy to do business with Noranda.

Noranda People - As Others See Us

All of this tells me in the most marvelous way through the eyes and ears of an uninitiated third party that the enterprise I see is actually showing others a similar picture.

I have spent this much time on people because they indeed are our most important asset. They are the interface with our customers, our opera-tors,

our governments and all the people who influence the business that Noranda does. They are the people who carry our reputation, who build respect for the enterprise, whose consistency and ethics live up to the high standards we want and who throughout the world are seen, on the one hand, as warm and friendly and gracious individuals while, on the other hand, are respected for their thoroughness and professionalism in fair but firm business dealing.

Noranda People as Elegant Thieves

Satisfactory or Unsatisfactory?

The best compliment, ever, about us was to be called "Elegant Thieves," "Elegant" meaning warm and friendly, "Thieves" meaning firm dealing.

In other words, nice guys don't finish last!

In the world we are in today with its inherent risks and tremendous values at stake, compromised ethics, whether personal or corporate, discriminatory attitudes, the lack of interest in people, or the capacity to make enemies instead of friends is simply unsatisfactory.

In our world, the word "satisfactory" carries an understatement. We are all expected to be satisfactory and that means doing our best all the time. When we are very satisfactory, we are approaching distinguished performance in the ultimate pursuit of excellence. When the word "unsatisfactory" is used, that is the ultimate put-down which, in a world of distinguished performers, is truly unsatisfactory.

So that is where the people of Noranda Sales come from and how they get to where they are going.

Now what do they do?

Marketing Disciplines at Noranda Sales

We define marketing for a resource enterprise under the following headings:

- Analysis: in some companies, that is the market research activity, but in our business, it encompasses not only market research in commodity and product applications, economic research, price forecasting, global market trends research, and competitive research and customer research, but also the continuing process of examining how we do things and how we can do them better;

- Distribution: often described as the most significant marketing function because it is the function designed to deliver to the customer the

right product at the right price at the right time on a consistent basis, in our business encompasses not only the mechanics of delivery and its costs, but also inventory and the inventory-management process, the necessary linkages to a global transportation network, the significance of relationships with major transportation enterprises with which we spend hundreds of millions of dollars, the focus on the reality that we are a transportation- and distribution-intensive business and must constantly be striving for excellence in all aspects of this vital function;

- Policies, Practices, and Plans: the intellect of our business:

    - Our Policies relate to the standards we set for doing business including our ethics, our compliance with law, the environment, consistency in our relationship with customers, a pervasive and comprehensive interlocking across many disciplines with customers and the overall ethic we bring to how we do things, taking into consideration the interest of our shareholders, our employees, our customers, and our governments;

    - Practices relate to how we do things, our terms of trade, how we price things, how we respond to customer complaints, the linkages between the commercial people and other people on the molecule including our operators, the accountants, the treasury function, our environmental people, our research people, and our exploration people;

    - Finally our Plans; these are the key actions that dictate the path we will follow in the future, are the means of communication between commercial people and other important elements of our company and do clearly indicate the road ahead; plans break into two components, long-term strategic plans that set targets for the decade of the 1990s and shorter-term business plans that are like the steps of a staircase leading us to our ultimate goals for the year 2000.

- Sales, Trading, Procurement, and Broking: the action activities of our business and essential to utilize all the other thinking that goes into the operation;

    - Sales is, of course, the procuring of orders from desired customers; procurement is the procuring of needed raw materials for our processing plants,

- Trading covers a multitude of activity, including the provision of our services to both related and unrelated external Noranda companies, agency linkages to other mining companies for the sale of their products in markets we serve, the purchase and resale of commodities for profit, and generally any other activity that requires an innovative, risk-taking, entrepreneurial spirit to add value to our commercial activity;

- Finally, commodity broking, an extension of all of our activity through our wholly owned subsidiary, Rudolf Wolff & Co. in London, England, is our ultimate linkage to terminal markets and the provision of a broad range of commodity-broking services to important clients of Rudolf Wolff who, in most circumstances, are customers of Noranda.

- Finally development, which we put under three headings:

    - the development of people;

    - the development of product-related research, application and market development;

    - and, finally, a concentration on our future through commercial business development designed to meet the accelerating changes in our marketplace with innovative ideas linking us to customers in equity or non-equity joint ventures.

So this is the intellectual and operating fabric of the enterprise.

Marketing Organization at Noranda Sales

What we have done in the past is to link our divisions and departments to commodity production streams. So at present we have a copper and precious metals division, a lead and zinc metals and concentrates division, and a fertilizers, chemicals, industrial minerals and trading division.

Our commodity-broking activity is carried out separately by Rudolf Wolff, with offices in London, Hamburg, Tokyo, and New York.

Noranda Sales conducts its commercial activities from Toronto, Cleveland and London. Our business of nearly $4 billion in 1987 was carried out in

some 65 countries. It would be almost true to say that the sun rarely sets on a Noranda Sales' person in pursuit of a customer.

Now what are the boundaries between Noranda Sales and the other business functions in Noranda Minerals?

Our company, Noranda Minerals, is established with a high degree of autonomy and decentralization so that my operating colleagues are clearly seen to be business leaders running their own businesses and employing Noranda Sales for commercial services.

Thus the linkage is one in which Noranda Sales participates in the business-planning process for each of the business units, advising and recommending on commercial activity and, when the business plans are finally completed, being responsible, as agent, for implementation of the plan. As changes are needed, it is the responsibility of Noranda Sales to recommend those changes on a timely basis.

As an overall safety net and to assure consistency, particularly on policy matters, the President of Noranda Sales retains a corporate authority on commercial policy, but the major emphasis is on a bottom-up process in a collegial environment to provide everybody with the maximum opportunity to understand the reality of the marketplace, the need to service customers well, and in the end to provide the broadest understanding and opportunity for all the people in the business to build sound business careers doing a highly satisfactory job for all those on the molecule.

Markets for Noranda Minerals' Products

Perhaps a comment or two about our markets is appropriate.

How do people normally see us?

We are a commodity business producing fungible products; that is, products similar to other people's products and serving a common set of customers. We are inelastic in the sense that we cannot quickly expand our markets or contract them using price as the incentive.

In fact, those companies that focus on market share as an important commercial objective and use price as the instrument to expand it quickly find it is a loss leader's route, as prices generally tumble quickly with the biggest operator suffering the most; lower prices on big productions cost more than lower prices on small productions.

How do we see ourselves?

We define ourselves as defensive marketers; that is, marketers de-fending value in the marketplace, recognizing that every sale is not a good sale and understanding the need to walk away from business if the ultimate impact of doing it is to destroy value. This means that we are constantly seeking to add value. We add value through the relationships we develop with our customers,

in order to create a situation in which the question, monthly, is not whether we are going to do business, but how we are going to do business.

We are in a world of accelerating change.

In a world of accelerating change, we want to be seen as responsive and flexible, always keeping an eye on our main responsibility, and that is protecting the value of our products for our shareholders. This means that price discounting as an active practice to deal with market competition is simply unsatisfactory and unacceptable. It does mean that spending money on product research, product applications and market development is highly acceptable, particularly when it is aimed at creating special relationships and market niches for us with our customers because we do something differently than others.

The Noranda Development Disciplines

What Do We Mean by "Development"?

It's perhaps worth defining what we mean by our development functions, and I am going to quote my remarks made to the Metal Bulletin Zinc Conference a few weeks ago:

- Product technology is the development of science and knowledge to provide competitive advantage for a material in an end-use application with a customer as a partner in the process;

- Product application is the discovery of persons with a need for product technology development, the organization of activity to meet that need, and the transfer of the science and knowledge to fulfil that need;

- Market development is the transfer of science and knowledge to the marketplace, its commercialization and application on the broadest possible range of products;

- Market research is the work to define opportunities and problems leading to product technology development and the pursuit of opportunity.

In seeking market niches, we strive to make our customers our partners and to work jointly with them and their customers and, ultimately, end-users in establishing applications for our products. This process is one of vertical integration to the end-user on a non-equity basis through a chain of com-

panies which have a mutual interest in serving the end-user and have decided to do business together in a "supply security, product research and market development environment". We call this a "non-equity joint venture".

So this is development as it applies to our existing and future business. By definition, it requires very close collaboration between those in marketing and those in product technology development. It requires a specific focus on customers because that is where the needs for our development activity come from. It requires customers to be willing to participate jointly in the exploitation of technology we develop, as they are the user-friendly group that justifies our activity. Their activity, in turn, must be focused on some significant end-use application opportunity so together we have justification for the considerable effort we expend on development work. Development also applies to people. In a world of accelerating change, the 1975 person is clearly obsolete in 1988 if that person still expects to do business the way it might have been done in 1975. Trying to be a creative business in a world of accelerating change requires us to keep our people focused on the need to remain contemporary, to continually be students of better ways to do things, and to enhance skills through attendance at in-house and university programs designed to broaden a business manager's focus and capability.

So career development, career planning, functional exchange, intellectual pursuit, skills repair and renewal are all important activities which we are trying to maintain, implement and expand to give every person who works for us the optimum opportunity to develop their ultimate career and to perform for Noranda.

FUTURE MARKET DEVELOPMENT NEEDS

L. A. Morris

Introduction

It is indeed a pleasure to have been invited to participate in this seminar, not only to share with you some ideas concerning current and future market development needs but also to have the opportunity to participate in the overall discussions on marketing policy issues in the mineral industries. Marketing texts, courses, seminars and general dialogue all too frequently focus on more up-scale products or those having mass consumer appeal. I'm not saying that the marketing aspects of base metals and minerals, or commodities in general, have been totally ignored, but the flow of ideas and information is minuscule relative to other (consumer-oriented) market sectors. There is certainly a great need for more dialogue on marketing issues amongst those involved in the minerals sector, particularly in Canada where the minerals field is such a large component of the overall economy. Hopefully, one outcome of the present seminar will be a resounding expression of the need for increased marketing activities in this important area; others would include unique marketing strategies and tactics which will assist the minerals industry to deal with the many challenges that will be faced in the future. It is also anticipated that this seminar will serve as a catalyst for future discussions in this critical area.

Marketing, General

At this point, it is very tempting to offer a clear, concise definition of marketing which would be acceptable to all and to subsequently isolate the equivalent of the market development function. I doubt this can be easily done since we are constantly dealing with different people having differing perspectives. Consider, for example, some variations in the orientation of individuals to marketing, from product-oriented through sales-oriented, to marketing-oriented to market-oriented. Also, there are significant differences in the traditional practices of firms. Consequently, we find that authorities offer various definitive statements and practitioners have differing concepts of what is or is not marketing. It's probably even worse for market development. Nevertheless, let us consider the following which primarily pertains to the market-oriented firm: Marketing includes all business activities necessary to determine the needs and wants of customers, assists in product development to meet these

requirements and participates in post-sale followup to keep the customer satisfied. It always keeps the customer informed. The function identifies potentials, makes forecasts, develops new markets and aids in production planning. Marketing selects channels of distribution, provides for physical distribution including packaging, transportation, field warehousing of finished goods and delivery. Marketing services are provided including order entry, financing, credit and collection. The group determines marketing strategy and contributes to overall corporate planning.

Thus, marketing includes all business that makes possible the determination of what should be produced and controls that which is produced from its creation to ultimate consumption. Successful marketing maximizes the want-satisfaction of the customer with high efficiency and, consequently, helps provide the profit necessary to the corporation to achieve its goals.

It should be emphasized that the market-oriented firm is not run by the marketing department. It is one wherein the creation of customer satisfaction has been adopted as the basic and most significant factor in all its decision-making processes - by all its decision-makers both in marketing and nonmarketing sectors. Implementation of marketing is not restricted to the marketing department; it is a function of the total firm.

Commodity or industrial marketing is simply the performance of these marketing tasks. It is the marketing of goods and services to industrial customers for use in the production of goods.

Market Development

The market development function is probably more difficult to define in a clear, concise manner. It cannot be isolated from the total marketing effort but may be considered to have its roots in the areas of market research, product development, marketing communications and technical services. Certainly there is a strong interaction with the other marketing activities and, in fact, a high level of interaction with almost all phases of the business. The line sales function, distributor network, production, and research and development are important areas of interaction.

A number of factors concerning commodity (industrial) marketing relative to consumer or retail marketing should be highlighted prior to a specific discussion on market development, since they impact the overall scope of the function in the minerals sector.

The commodity marketing situation is just about the reverse of consumer or retail marketing. In general, in commodity marketing, one has short channels of distribution to relatively concentrated markets; heavy emphasis on direct relationships; fewer sellers and buyers; larger units of sale; much use of negotiation; infrequent purchases with fewer total transactions; well

informed, highly organized and sophisticated buyers; predominately rational buying motives; strong reliance on detailed value and vendor analysis; heavy emphasis on quality standards; and technical testing procedures in many of the larger firms. In addition, consideration must be given to the impact of government and environmental regulations on marketing activities.

Falconbridge Market Development

Addressing the question of current and future market development needs, I would like to rely, quite naturally, on the situation which currently exists at Falconbridge Limited and our intentions to maintain or expand activities to meet future conditions and market challenges. Maybe I'm presumptuous in assuming that Falconbridge has all the elements that are needed for success, but it's the area I know best.

The basic functions which make up the market development activity consist of the following:

- market research;
- product development;
- marketing communications;
- technical services.

The primary elements of the market development strategy include the points below:

- Develop new or improve existing products and packages with emphasis on value-added items and specific market niches in response to the needs and wants of the end-user.

- Specify quality standards for all company products.

- Provide technical backup for all products produced by the company.

- Provide the market research function in support of product development, sales and overall decision-making.

- Develop marketing communication programs in support of product sales and the enhancement of the corporate image.

The market development activity is expected to contribute to the company's fortunes by at least maintaining its position or share in the marketplace and hopefully improve this position over the longer term. Enhanced revenue

generation and increased profit margins should result from a well-executed program. Another expectation is a contribution to the overall expansion of markets fundamental to the health of the industry.

I'd like to give a brief description of these four elements as they are related within Falconbridge.

Market Research

The prime responsibility of the market research function involves the collection, organization and interpretation of statistics, facts and opinions related to core metal products (Ni, Cu, Zn, Co Ag, Cd) to form the basis of business decisions and to aid in improving the quality of these decisions. Bulk statistics alone are insufficient and emphasis is placed on the development of supply/demand information by product, by producer and by major market area. (Supply/demand relationships are also provided for applicable metal concentrates.)

Compilation and analysis of competitor data including capacities, product plans and production costs are important areas of activity. The need to identify threats, strengths and growth areas which impact the use of (core) metal products and new business opportunities is well recognized. A significant concern is the impact of health and environmental requirements and the need to develop reliable information in this area. Trade agreements and duty structures must be monitored constantly to determine the impact on our competitive position.

A very important aspect of the market research function is, of course, the support of product development activities. In this area, the specific objectives of market research are to determine

- detailed information on customer needs;
- that the product has a market;
- where the markets are;
- if the market can be penetrated by the firm's capabilities in terms of product type, quantities and dollars;
- priorities among program possibilities;
- the competitor position.

Good research requires the establishment of a fairly extensive information network involving both internal and external sources. It is not unusual to find that there are little or no definitive data to meet the needs to support new product development or new market opportunities. Some countries do a reasonable job of reporting basic statistics; others do little or nothing. A

future need is the establishment of quality organizations which can collect and disseminate reliable information in a minimum timeframe.

Product Development

Product development constitutes a key part of the market development activity. This function, in our operation, serves as the primary link between the customer, R&D and operations, and strongly interacts with the market research function. The primary objective, of course, is the development of new or existing products to enhance the position of the company under current and future market conditions. It is a difficult task in the world of the primary metal producer since there is often little to work with. In many cases the only apparent options are chemistry, shape and package. The best approach is to have an open mind and ignore that fact that you are producing a "commodity".

The following summarizes the basic factors and activities which underlie a good product-development program:

- Determine what the market wants or needs through ongoing customer contact. In our case, we're not only looking at our immediate customer. We also need to talk to the ultimate end-user, to see the problems for ourselves.

- Generate concepts which lead to the development of new or improved products and packages.

- Identify new applications for existing products.

- Produce the best product/package required for a specific application.

- Focus on market niches and markets having associated premiums.

- Emphasize a product line within the technical and financial capabilities of the company. Don't restrict yourself to that because if you've made a monumental breakthrough, you'll need to stretch the resources of the company.

- Participate in product marketing by way of customer visits, technical seminars, exhibitions, product literature.

- Provide backup services to augment physical product offerings,
  a) applications of products in specific cases,

b) customer inquiries, and occasionally,
c) customer complaints.

- Provide training in product applications to marketing and line sales personnel, including agents and distributors.

- Provide early recognition of significant changes in competitor product development and, certainly, in end-user technology.

These "conditions for success" should not be construed as guarantees for success. Failure to meet them increases the odds against successful product innovation and marketing. Unfortunately, meeting them does not necessarily guarantee anything.

Other conditions in the organization must exist to improve the success rate of product development. Most significant is managerial and technical capacity in top management available for product planning. Very closely allied to this - and this may be even more important - is a favourable attitude toward new product development. More than lip service is required.

Product development creates new demands on many sectors of the organization, perhaps in good times in the face of a relaxed easy life, perhaps in hard times when the corporation is in a survival mode. New responsibilities arise. Complacency can be a problem. There are financial risks. People in high places may agree with the idea of the desirability for new products, but actually are not very receptive. Unless top management really has favourable attitudes, the development of new products is bound to run into trouble.

Another concern is the existence of a real market need. This should be well identified and forecast to a reasonable degree. Product testing should commence up front just as soon as representative prototypes are available.

One further point is that the entire product development effort needs to be integrated throughout the company. It's not merely someone's "baby" to be delegated to a committee or department. Furthermore, a "champion" should be identified and assigned the appropriate responsibilities to carry projects through to successful completion.

Role of Trade Associations and Technical Societies

The outcome of a successful product development program primarily affects the position of the company in terms of enhanced revenue generation and/or market share. Programs are not specifically designed to contribute to the overall growth of the market. This, of course, does happen but usually in a minor way. I don't mean to downplay this but it is a relatively minor issue. The development of a new product may result in significant cost savings for

the end-user, thereby stimulating increased use for particular applications. Also, a new product may open up a whole new applications area, again contributing to overall market growth. However, it would take a monumental product breakthrough to make a significant impact on global demand for a particular metal.

Organizations in the minerals/metals sector have recently been through some hard times. Much of the internal research and development capability has been dismantled and, consequently, the capacity for significant product breakthroughs which might strongly affect overall market growth has been significantly diluted. Furthermore, there are more players on the street. Back in the 1950s, there were five or six; now there are thirty. Market shares of the "established" producers have shrunk to the point where there no longer is a dominant producer or industry leader. Simply put, no one can afford to develop the market for the sake of the industry on an individual basis.

And, unfortunately, I don't see this happening in the near future. Perhaps in another five years, if markets are still strong, this may happen. But people are gunshy; they're waiting for the downturn.

Direct, cooperative approaches between competitors can lead to difficult situations, particularly in North America. No explanation is needed. Cooperation with specific end-users also has its problems, since the possibility of alienation of other customers looms high. Call it "the why not with me" syndrome.

Market forces and other factors have put us in the position where much greater emphasis must be placed on participation in industry associations and technical societies. Perhaps this area is the most significant future need in the market development sector. Participation comes in two forms, financial and manpower. In general, past participation has been mainly financial and weak at that if measured in terms of overall product sales. In many cases, the result has been weak organizations.

Dependence on industry and technical organizations in the future will be required for assistance in the area of market exploration and development, R&D, environmental and health concerns, trade statistics, public relations, government liaison and possibly product standards and certification. Our competitors who deal in other (materials) fields are not standing still. If we do, they will surely pass us by. We have good products and there is room for improvement. We must believe it. We should not be frightened by terms like "mature metal" and (decreasing) "intensity of use". Look around our major cities and tell me the Stone Age is dead.

Larger financial commitments are required to get the job done in a professional manner and within a reasonable timeframe. We hear figures like one or two percent of sales devoted to R&D by some leading corporations. Not to show favouritism, let's isolate the International Lead Zinc Research

Organization on the zinc side. The budget is some $2M US. Compare that if you will with global zinc sales.

Financial support is only half of the coin. In my opinion, input on the part of member producers and end-users is required. I feel this is where we have failed in many cases. The strength and, consequently, the output of industry associations and technical societies can be measured in terms of member input. We all must get involved for the long-term future prosperity of our industry.

Falconbridge market development personnel have been quite active in industry associations and technical society activities, given the financial and manpower resources available. A recent expansion in personnel means more participation and input in the future. We plan to increase our activities in this area, perhaps even the financial contributions, as well.

Look around you and you will probably find that the essential organizations already exist. If not, help form one. In our areas of activity, I can cite as examples the Nickel Development Institute, the International Copper Research Association, the International Lead Zinc Research Organization, Interzinc, the Cobalt Development Institute, the Nickel Producers Environmental Research Association and several key (country) copper and zinc development institutes that do a very effective job.

Market Communications

The marketing communications activity is a key part of the overall market development program. The basic objectives of the communications programs are

- product promotion;
- education of the line sales force, distributors and end-users concerning the attributes of company products and services;
- enhancement of the company image.

The main activities encompass the preparation of product literature and advertising and coordinating the arrangements for seminars, exhibitions, receptions and plant tours. A successful communications program depends primarily on the development of unique product and service promotional concepts, preparation of quality materials, timely activity arrangements, budget control, interoffice coordination and coordination with outside contacts and agencies. Extensive use is made of resources within all quarters of the company including personnel in marketing and sales, public affairs, operations and R&D.

Particular emphasis is placed on technical seminars highlighting product attributes and applications. These seminars are designed to reach either line sales personnel (including the distributor network) or existing and potential end-users. Another major activity is the participation in appropriate trade shows. Personnel in the product development function play a significant role in these activities.

Technical Services

Market development personnel coordinate and participate in product-related, technical services initiated on behalf of existing and potential end-users or other organizations with interest in company core products. Problems, complaints and inquiries are received directly or from the various sectors of the company, primarily through the line sales function. The requests are analyzed and directed to the personnel in the best possible position to respond. In many instances, it is necessary to draw upon the special expertise or facilities housed in the R&D or production areas. Final response to inquiries or complaints is coordinated by the market development group.

Summary

An outline has been presented describing the primary activity centers of the market development function. The basic areas include market research, product development, marketing communications and technical services. The essential elements involved in each of these activities were outlined and future requirements indicated.

Major organizations should have at least the fundamentals of a market development activity which can contribute to the overall health of the individual company and the industry at large. It is recognized that the primary purpose of market development is to focus on the position of the company in terms of market share, enhanced revenue generation and improved profit margins. Nevertheless, achievements by individual market development groups can impact the demand side of the total market by stimulation of growth in existing sectors and the creation of new applications. The introduction of market-development activities and the expansion of existing groups in many organizations are future requirements to ensure the overall health of the mineral industry.

A primary need is greater participation in industry associations and technical societies on the part of individual firms. Participation comes in two forms, financial and brainpower. The latter can, in general, be handled best by market development and R&D personnel.

The mineral industry will necessarily depend heavily on the support of industry associations and technical societies in the future. The former primarily deals with the collection and dissemination of statistical data, market exploration, market development and product research and development on behalf of the industry involved. Technical societies are essentially engaged in standards writing, certification or the collection and dissemination of scientific and engineering data to individual members. It is imperative that adequate funding be available to finance quality programs in a reasonable timeframe. Sufficient input must be provided by producers and end-users to ensure that the programs are meaningful and that the information generated is accurate and up-to-date.

A clear benefit of participation in associations and societies that often goes unrecognized in many organizations is the personal contacts made with others in the metals and materials fields and the attendant opportunity to share opinions and views in areas of mutual interest.

PRODUCT DEVELOPMENT

Hugh Wynne-Edwards

Alcan, to put it in a Canadian perspective, is arguably Canada's largest manufacturing company, certainly the largest manufacturing multinational headquartered in Canada. In terms of economic performance, Alcan places sixth or seventh. Those few ahead of us are either headquartered elsewhere or, as in two cases, are government utilities. Thus we play a conspicuous role in the private sector. We are an analog for Canada in many ways: we're inexhaustibly polite; we tend to be rather shy about being the largest aluminium company in the world; we'd rather be number two but, in fact, we're neck and neck with Alcoa; we're vertically integrated with natural resources; we are utterly dependent on international trade for our business and 70 percent of that is with the United States. So Alcan is a raw-material-intensive, fully and vertically integrated, value-added manufacturing system oriented very much to world trade, which is a very fair description of Canada as a nation.

The company is a product of persistent anti-trust threats following the breakup of Standard Oil which led sequentially to the separation of the non-American assets from what became Alcoa. The international assets became Alcan. This skillful government intervention produced the usual market distortion: Alcoa became a huge company with complete dominance of the US market but no metal, and Alcan was up to its knees in metal and had no markets. In the 1920s and through to the end of the Second World War, Alcan concentrated on moving metal internationally into a host of markets and finished up with manufacturing facilities in about thirty-five countries and distribution outlets of one sort or another in well over a hundred.

We were known as the aluminium missionaries: at any price, anywhere, we would deliver metal and persuade you to fall in love with it. That's changed. In the 1980s there has been a certain amount of rationalization back to the countries that make sense, so in a sense we have hung up our missionary collar. The company in the 1980s has become much more streamlined. In the last five years, I estimate that we have taken $150 million dollars of costs out of the North American operation alone and, as a result of the current position of the commodities cycle, we are pulling in money hand over fist at the moment, as most metals companies are. So that's Alcan.

The problematique faced by Alcan along with most other metals and commodities companies can be shown in various ways. One way that I like to look at it is in strict performance terms. Figure 1 shows Alcan's return on equity from 1955 to 1985 compared to the Standard and Poors 400, which is one of the industrial indexes in the United States. That was drawn by Alcan's finance department about 1986 and it shows a trend with Alcan giving a rather flat performance, at about 10 percent return and departing somewhat from the Standard and Poors 400. As a scientist, I didn't like that statement very much so I produced the same figure another way; what figure 2 shows you is that the Standard and Poors 400 Index is tracking up on a timing that is more or less uniform over that thirty-year period. The cycles in the Standard and Poors are about the same because they are blanketed by the mix of industries it contains, whereas Alcan has experienced two worlds: one prior to 1973, where it was turning in a distinguished, somewhat more cyclical performance - and arguably catching up with Standard and Poors - and the second after 1973, when things became even more unpredictable.

It could be argued that we have been falling out of the sky at a great rate since the summer of 1969. In my view, that is the impact on consumer demand of the mental effects of the moonshot and seeing the earth as a small ball, of the environmental movement (which was brought on to the world stage by the Nixon election of 1968 and then by the Stockholm Conference and so on), and finally of the oil shock when somebody turned off the tap on the commodity that people took for granted. That seems to have changed the world. We know that it's taken over 20 percent off the energy demand forecast curve both in Europe and in North America and, for things like aluminium, has changed the pattern of markets enormously.

It's easy to see how a company like ours could misinterpret this first cycle as being just a very severe storm, somewhat like the last. At the 1980 downturn, we were forced to refocus. By that time, fortunately, using the research and development organization as the experimental facility, we were ready to make a number of changes. In 1986 the company redefined its mission, but the process really started in 1980, when the company decided that it would become a leader in a chosen set of technologies and a leading innovator in a chosen set of businesses. That was a very large strategic departure for the company and something that it hadn't had in its previous history.

In a capital-intensive industry like aluminium, the first effect of that change in consumer patterns and reduction in consumption was massive overcapacity. It takes ten years to plan, finance and build large increments of new capacity. Those for the early 1980s were planned with the logic of the early 1970s, and most of the large commodity concerns sank. There was a very difficult time while capacity was being rationalized and absorbed by the market and, in many instances, non-economic companies continued to operate in countries with varying degrees of government involvement. One of the huge

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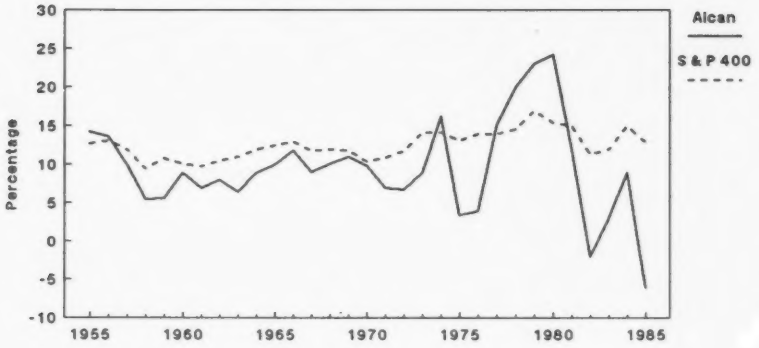

Figure 1

RETURN ON EQUITY

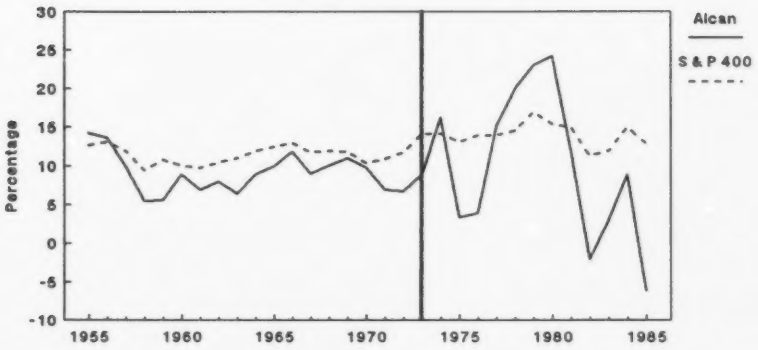

Figure 2

effects of 1973 was the amount of state ownership of primary capacity around the world. It's well up around 40 percent of the Western World primary aluminium capacity.

It's worth looking a little more deeply at this pattern. It's rather a shattering revelation. If you look at our erstwhile cousin and now chief competitor, Alcoa, in figure 3, you can see that we make more money in the highs because we still sell ingots in large quantities, and Alcoa turns around somewhat faster in the lows because they are the number one in blister in the United States and we are not. Otherwise, the behaviour is almost independent of management, a very sobering realization for the people who think they are running companies. They are really up on the bridge going for a ride in a storm that is beyond their control. Not a popular message, I can tell you.

And it goes beyond that. Figure 4 shows Noranda and Inco, two companies with major assets in Canada that, again, are very integrated and international in their trading. Again, you see to a first approximation that Noranda and Alcan, with completely different products, went for much the same ride. Inco took a different path and had its reckoning somewhat earlier than we did and began the turnaround and cost-cutting and rationalization much earlier than we did. So that was the problematique.

The first force that was acting then is what I would broadly describe as doing more with less, in that we now have a market that is highly competitive, over-supplied, and demanding more and more performance per metal unit in all of the products that it uses. The metal can is a superb example of tremendous competition. The amount of metal going into a can decreased by well over 50 percent in the last seven or eight years with huge consequences for the industry: very stiff competition, all directed towards doing more with less, or getting more utility per unit of material invested.

Another tremendous force has been the force of substitution. There is now a palette of materials available to the designer which gives him more freedom of choice than he has ever had in the past. Aluminium wasn't produced commercially until 1896. Demand was very small; it was a curiosity metal, really, until the Second World War when the war effort produced this tremendous rise in capacity. The early uses were those for which only aluminium would serve. But following the War, as this capacity was absorbed into consumer products (windows, buildings, siding), the bulk of the competition was against wood. The other market that was growing briskly was packaging, against waxed paper.

Figure 5 shows the history of aluminium. In the simplest mathematics, the curve shows material B being substituted for material A until it occupies 100 percent of the market. For aluminium, the first approximation is wood and paper and cast iron. Further up the curve, aluminium's competition is against steel, for can body, and against copper and brass, for automotive radiators. The competition is becoming more sophisticated in terms of the

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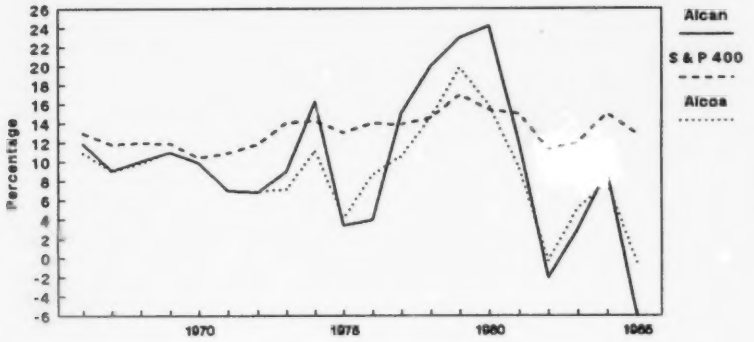

Figure 3

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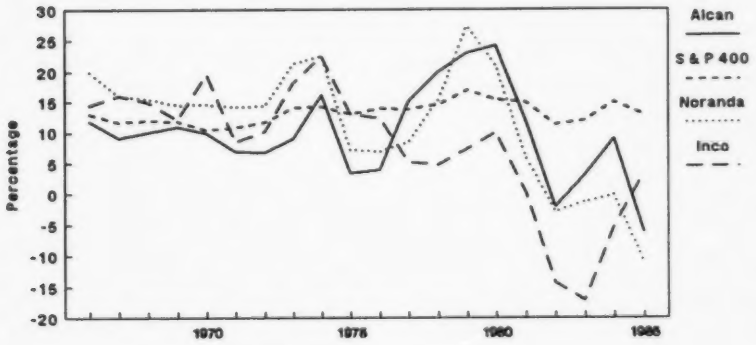
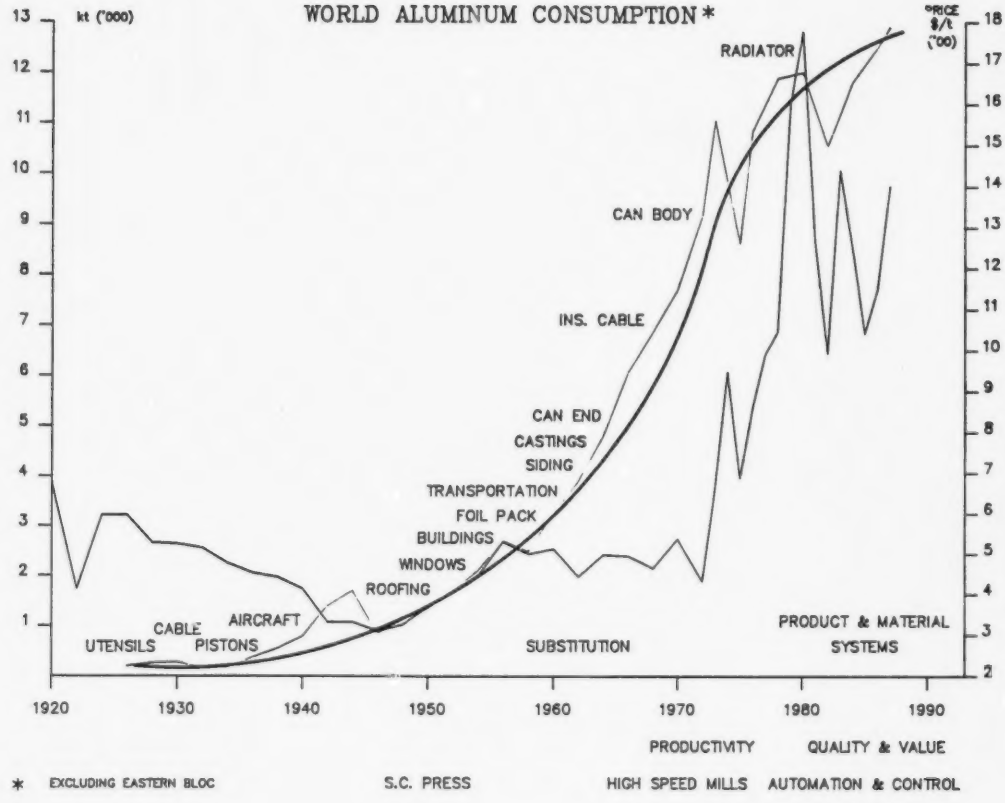


Figure 4


WORLD ALUMINUM CONSUMPTION*
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SUBSTITUTION
PRODUCT & MATERIAL SYSTEMS
PRODUCTIVITY
QUALITY & VALUE
S.C. PRESS
HIGH SPEED MILLS
AUTOMATION & CONTROL
* EXCLUDING EASTERN BLOC

Figure 5

materials. An implication is that as history marches on there will be another curve which will displace aluminium from many of these things. The overall pie may be growing but to the right of the curve we already see the contenders: ceramics, plastics and others.

The siding market, which is a specialized North American market, is moving rapidly to vinyls, keeping aluminium as the up-market luxury statement, the defining segment. About 30 percent of the windows in some countries are now made out of plastics of various kind. There are lots of exotic roofing materials now. The competition for the packaging market is enormous. You can see that this transition is well on its way.

Figure 5 also shows the price of aluminium in dollars per ton. It stayed constant for a long time and then shot up and became highly unstable. Since the diagram was drawn, the spot price of aluminium has actually hit 30 on this scale, which is way off the chart. This demonstrates to me, at least, that the fundamentals in the aluminium industry over the last fifteen years have not changed at all. What goes up must come down.

After 1980, we went after two things: lowest cost and excellence in a rationalized set of four businesses. The corporate mission statement says "in our chosen aluminium businesses". The word "chosen" is in there because we dropped a dozen countries and a lot of businesses, rationalized a lot of plans and took out a lot of management. We set out to have five layers of management from the Chairman to the shop floor. We haven't achieved that, but we took out layers and layers and it was quite refreshing to find how much time-wasting activity dies away when you do that.

That was taking cost out. We've also gone relentlessly after excellence. In fabricated products, the driver has been the beverage can, which is the most competitive aluminum market. To serve this market, the rolling industry has had to fundamentally change its behaviour. The lubricants it uses, the speed at which it rolls, the diligence with which it rolls, and the scale on which it rolls, have all changed, driven by a highly competitive market. The can is made by stamping and then cutting aluminum sheet in machines that go to sixteen and eighteen "out". In other words, sixteen disks are cut as the sheet moves through the line. Those are cupped, then drawn and ironed. The drawn wall we make now is much thinner than a human hair, and the tolerances of the drawing machines and the canning machines are such that everything has to be right. This means that the tolerances on the sheet that was acceptable to the industry are now approximately .0002 per thousand. Seven years ago we couldn't even make that. In earlier casting practices, if a bit of dust drifted into the ingot as we were pouring it, rolling proceeded anyway. Specks like that become boulders in the canning industry, which meant that the need for metal cleanliness at the smelter has completely revolutionized the way we treat hot metal and the way we cast.

The result is a tremendous emphasis on getting it right the first time and all of the Japanese attributes: doing it once and doing it properly, getting the productivity up by quality rather than by huge capacity with vast quantities of waste and scrap. The benefits of that are plain in the income statement, so there's a great spur in a corporation like ours to do more and more of that. Reducing costs and striving for excellence are not the same thing; they have to be twinned and managed for separately. They became dominant ethics enshrined in the mission statement of the company in 1986.

The second part of the mission statement is that we will build a significant array of new businesses based on our strengths, that is those with superior growth and proper potential.

That has gone forward. We're now about an US$8 billion company. We've spent something over $300 million on experiments and small acquisitions to get ready. We have not yet made a large acquisition, and may not make one. We are doing very well with the rather slow, but perhaps less risky, roll-your-own philosophy. We have about 25 start-up companies in various stages of growth. All of them have operating losses at the moment, some more spectacular than others, but we've learned a tremendous amount about how to choose, how to invest and how to manage an array of businesses that are quite different from the ones we had before.

If you decide that you want superior growth and profit potential, your choices in fact are fairly limited. Figure 6 shows a simple value-added chain using examples from the automotive industry: from raw materials, to chemicals, to metals, to semi-fabricated products, to fabricated products to more complex products. That describes well over 90 percent of Alcan's businesses. The end-products become somebody else's parts and components. They go into devices, the devices go into sub-assemblies, and ultimately into an Original-Equipment-producing system.

While we've given up the missionary role, we're still very much enamoured of aluminium. Certainly, I'm convinced that its day is just dawning. But this period of substitution for low-value materials is coming to an end and it will drive alumimium into a series of markets where it will perform a role that nothing else can perform.

The other alternative is horizontal diversification: at level 1, for instance, you can go into the electricity business or you can go into the mining business, diversifying into other minerals. Reynolds, another aluminium company, saw glittering results this year, mainly because it found gold at its bauxite mine

At level 2, you can diversify into the chemicals business very logically and fairly safely with the experience that you have. Then at level 3, if you are in the ingot business and your subject is aluminium, why not magnesium and/or silicon? Similarly, if you are in the castings business, why not the piston business?

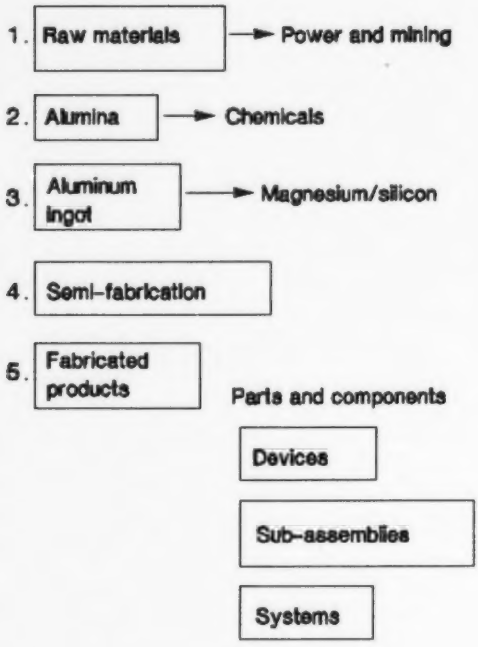

Figure 6

But curiously, over the seven or eight years that we've intensely been studying this, the company has rejected the horizontal options. There are two magnesium plants being built in Canada. We're not building either of them. The reason is that the analysis always comes back to the fact that aluminium is simply a better bet. We've looked at polysilicons semi-conductor. What we're looking for in that regard is other uses for power, other power intensive or energy intensive products. And so far, we haven't found one that we wanted to pour our money into. At the chemicals business level, we have found a certain amount of diversification, but we haven't done any. Inevitably, since we want higher growth and profit potential, we're being driven down this value-added chain and we now have got samples in there.

We've probably made the heaviest investments in ceramics and metal-matrix products targeted at aerospace and the transportation industry. That's a natural fit for Alcan. The degree of comfort is very high, since it's a bulk commodity business. It involves different materials but we are a materials company with a lot of material science, and the markets are ones about which we have some competent knowledge. The process has been one of searching and offering and testing but it's fair to say that the people looking for new business development have seen to it that things we're offering apply at just about every level.

A conspicuous investment that we have made in the systems business is in Spar Aerospace, which is Canada's lone prime space contractor with the Canadian government. We have made two investments with Spar and could actually end up controlling that company. It's not at all a materials-intensive company. It just happens that the materials it uses are light, which seems to resonate with us.

At the devices level, the main excursions have been batteries, aluminium air-cooled cells, and that sort of thing. Gallium arsenide is another. We began extracting gallium up just a few months ago on the logic that since we have gallium accessible in our alumina plants, we'll start at this end with the limit of the materials value-added and then develop a chain working backwards. We've done that; some of it's been successful, some of it hasn't. We do have a metataxial surface preparation gallium arsenide plant.

We made a huge investment at the sub-assemblies level in the substitution of aluminium for steel as the volume structural material for cars. If there are any Alcan watchers in the room, we had the giddy experience in October of seeing a Ferrari 408 and a Jaguar Supercar about five days apart, both using our aluminium structure technology. They were both prototypes, not yet in production, but a significant shot across the bows of the industry and the result of very, very intensive, hard work over a number of years. The aluminium car is now much closer to the customer.

These activities have opened up to us a set of new skills and new people and so on. And curiously, I can see the canning market requiring exactly the same behaviour. At least the skills we are developing and the confidence we are developing here are becoming highly useful back in the primary business where the competition is "a jungle out there". It really is and you have to be very fast on your feet: material quality has to be superb; it has to be backed up by an R&D establishment which increasingly is working for the customer, not directly for you. Marketing is becoming more sophisticated and more technical, and the whole process is more entrepreneurial. An unexpected benefit of doing this, as I see now, is that these skills, as we get used to them, are being integrated into other aspects of our operations.

In 1988 we are really wrestling with two enormous forces. One is this increasing competition in the market being brought on much as anything by

the globalization of trade. (Without turning to politics, thank goodness we did what we did in this country on Monday [in accepting the free-trade agreement via the federal elections] because nobody had prepared for the alternative. I'm delighted that the public saw fit to conduct this experiment.) Alcan faces global competition from global companies. One of the responses to that is to increase the rate of innovation and as a corporation, we've done quite a bit to get ready for that. We are much faster on our feet than we were, in understanding customers and responding to them. Part of that has been brought on by these small experiments downstream and the skills that they have brought to light.

The second huge force that is acting on the world now, is what I would call the globalization of the environment, which is simply that the environmental issue which was buried by the recession of the early 1980s has burst into full flower. This issue isn't going to go away this time, and the subjects under debate all transcend national boundaries. Therefore, by definition, the agencies and institutions built to deal with the environment in the 1970s will also do so. They were operating at the backyard level, so to speak, within national boundaries, and they don't have the apparatus to deal with things that concern us now; that is, the pollution of the oceans, the greenhouse effect, acid rain, and the ozone layer. These are large concerns in this country and I think the effect of that will be to build up immense public antagonism and pressures to see things better done because the apparatus is not in place to deal with this issue. It's going to take a long time to build it.

Our ability to be environmentally attractive as an industry is going to be tested severely as well. It's something we're going to have to get ready for, particularly in the aluminium industry which is, in some cases, notoriously polluting at the primary end because it uses carbon, which produces hydrocarbons. Otherwise, it's environmentally benign because aluminium is a recyclable material and packaging; the metal that makes the cans can be recycled and go back to the market about three times a year. Thus the product has many advantages in terms of environmental acceptability, but it will be mandatory for us to become a leader in overcoming the feeling that industry is careless about polluting. That's going to be a big competitive factor in materials substitution. I believe that those issues are going to hit the plastics industry extremely hard, if they haven't already.

DIGEST OF DISCUSSIONS

Moira Jackson

Editor's Introduction

Marketing is a relatively new concept in the minerals industry, largely because of the nature and history of the industry itself. Mineral production is so highly capital-intensive that, once the means for extracting the mineral from the earth is in place, it sometimes seems equally economical to extract it as to leave it there, no matter how low the price. Traditionally, a metal producer would extract the ore, perhaps refine it to varying degrees, and then sell it for what it would fetch. When prices are high, profits can be very large, but when prices decline, they may reach levels that produce hardship for all but the lowest-cost producers. In short, metals firms have been production-driven; their orientation has been towards tonnage sold rather than towards value added to the raw material. This is true even of firms that integrated vertically and reduced their dependence on the primary commodities, which are most subject to severe cyclicality in demand and price.

With few exceptions, producers have not been accustomed to creating markets for their products. In the first half of the century, when metals were being used increasingly as substitutes for other materials, their sales were primarily to manufacturers of consumer products or their components, and there was little need to worry about demand. This continued to be the case for most metals until fifteen or twenty years ago, especially in the period during and following the Second World War.

In contrast to the production orientation of the suppliers of metals, their customers - the manufacturers of product components and consumer goods - tend to be market-driven. In their choice of materials, they respond to many factors, such as price, physical characteristics, reliability, and novelty. Increasingly, new considerations such as health and environmental issues are becoming criteria in the selection of material.

A new era has been ushered in for most major metals now that producers of alternative materials have made inroads into what had been fairly secure markets. New awareness of certain undesirable properties of metals, the toxicity of lead used in paint and gasoline, for example, prompted the investigation of alternatives and shifts to substitutes. This trend was heightened by the oil crisis of the mid-1970s, as major consumers of metals sought materials that would reduce energy costs. Automobile manufacturers in particular looked, for example, towards lighter-weight alternatives to zinc die castings

and steel. The development of fibre optics as a communications carrier vastly superior to copper is yet another example of the revolution in materials use over the past fifteen years.

Faced with the challenges raised by material substitution, health and environmental concerns, shifting markets, and political and economic unpredictability around the world, metals producers have made surprisingly little use of marketing tools that are common in most other industries and businesses.

Individual producers do little market research, product development or innovation. Joint efforts, where they exist, have not been outstandingly successful. When prices are high, producers gladly, but somewhat nervously, gather the profits, but do little to prepare for the inevitable reversal of price trends. Rather, they resign themselves to such prospects as changes in the business cycle or high prices prompting customers to shift to cheaper substitutes, which result in decreased demand and hence dropping prices and a new period of lower profits.

The need to plan a corporate strategy which will lessen the effects of the downturns and make the mineral business more profitable and predictable is easily ignored during an upswing. The current explosion of prices for most base metals will end, but when and for how long and with what result are unknown. Awaiting the end with resignation is clearly not acceptable, now that the competition has developed to the present levels of sophistication. Markets lost because of high prices may not be regained when prices return to more affordable levels, so the challenge becomes one of learning ways to prepare for the downturn. It may be possible, not just to lessen its effects, but also to capitalize even further on the new knowledge generated, in future periods of strong demand.

A seminar on marketing and related issues is appropriate at this high-price stage in the current cycle since executives in many metal-producing firms seem to be ignorant of even basic principles of marketing. The aim of the seminar was to explore alternative marketing approaches which might help the industry to mitigate inevitable downturns, develop new markets, and search for new added-value products.

The perspective for the seminar was set by Richard Bauer, President of Eastern Alloys Inc. In his address on marketing as a major challenge for the mineral industry, he pointed out the need for firms to develop both current and new markets and products. John Tilton of the Colorado School of Mines analyzed changes in mineral trading patterns over the past fifteen years, and Lorraine Spiess, Executive Director of the Canada-China Trade Council, spoke on the market effects of recent developments in the nonferrous mineral industry in China. The second session included a paper by Margaret Slade of the University of British Columbia on the various mechanisms for establishing prices for metals, followed by Christopher Green, Chairman of the London

Metal Exchange, and Robin Bhar of the brokerage firm of Rudolf Wolff and Company, who commented on the role of exchanges in setting metal prices.

In a session on new marketing initiatives, William Dresher, President of the International Copper Research Association, discussed the different capacities in which trade associations might provide support to the industry. William Deeks, Vice-President of Noranda Sales Corporation, addressed the elements of establishing an effective sales division.

The final session was devoted to market and product development. Larry Morris, Director of Market Development at Falconbridge Limited, spoke out strongly in favour of complementing the industry's "sales" orientation with a "marketing" perspective. Hugh Wynne-Edwards, Vice-President of Alcan International Limited, gave a presentation on the need for metal producers, even those that are non-integrated, to include product development activities in their business strategies.

Structure

The prepared addresses in the first three sessions served primarily to set a historical perspective for the issues of product and market development, which was the primary focus of the participants and dominated most of the discussion. Pricing will be addressed first in this summary of discussions, followed by the implications of shifting intensity of use and developments in the centrally planned economies for the world's mineral markets. A discussion of the role and value of trade associations will round out the background. The presentations and ensuing discussions of market and product development will be considered in terms of the following model for determining market strategies at different market stages.

	Old Product	**New Product**
Old Market	Product Improvement	Product Improvement
New Market	Market Development	Product Diversification

Discussions after each address and at the end of the seminar drew together the full scope of topics raised by the speakers. The need for more product and market development in the industry formed the dominant theme, covering a range of issues from the internal management of individual firms to the future of the world's centrally planned economies. A consensus emerged on the topics of market and product development, and it must be noted that there was little controversy over any of the issues examined. Rather, the discussions following each presentation tended to be requests for extra details or clarification.

Pricing

For most nonferrous metals, prices may be announced by the seller (producer pricing) or they may be established on commodity (or "futures") exchanges such as the London Metal Exchange (LME) and the New York Commodity Exchange (COMEX). Prices for some metals are set by both methods. Participants seemed to agree that a "dual-price" system of using both producer prices and terminal prices is probably best. Producers and purchasers alike have found other alternatives unsatisfactory; for example, relying on trade periodicals for prices, as is done with some minor metals, means working with information that is not sufficiently current for metals that trade frequently and in large volumes. One industry participant observed that, since 1975, producer prices have been nominal, not real. Published prices, if higher than those quoted on exchanges, are discounted, especially during periods of market weakness. The problem with producer prices is that producers lead the market up, then lag it coming down, so that the process lacks credibility. Two-price systems for copper and aluminium have largely been replaced by pricing geared to LME quotations. Producer prices still exist for aluminium in North America, but they are now more closely related to the LME prices.

It was pointed out that interference in the free market should be avoided because the effects can be unpredictable. Copper producers' attempts to offer metals at low prices for the benefit of their customers in a period of rising prices were counterproductive because they created artificial shortages or distortion in material supply and ultimately led to higher prices than would have occurred had the market been allowed to find its own level. Customers are generally willing to pay the market price as long as they are not competitively disadvantaged.

The industry must learn how to use terminal prices to manage risk, and the LME must educate its constituents to use these tools. The prime method used to manage risk is hedging: the purchaser buys a contract for delivery at a future date in order to be certain of the price when he will need delivery. At that time, he will not take delivery from the exchange itself, but rather sell

his purchase and buy from his usual supplier, in the meantime having the security of knowing the upper limit of his materials cost.

Speculation

Futures markets are used by some traders, not as a means of establishing prices for the market or of managing risk, but in order to profit from changes in price over time, either by buying a certain commodity in the expectation of being able to sell it in the future for more than the cost of the transaction plus the return that might be realized by investing the funds elsewhere, or by selling short and buying when the price declines. Concern was expressed over the prospect of such speculation and how it may be controlled. An exchange representative observed that cash clearing can be a problem in that it may produce speculation in currency exchange rates. It was agreed that the terminal markets have a considerable role to play in this. The LME's clearing system forbids payment of foreign profits in advance, and positions must be closed at the end of the day. All deals are reported to the central system, to monitor turnover, but many deals conducted in currencies other than US dollars are not recorded by the clearing system, and are therefore not trapped in the turnover system.

COMEX was generally regarded as mainly speculative, rather than trade-related like the LME. Seventy percent of COMEX trade is generated by local investors buying and selling on their own account - speculators - whereas 97 percent of the business of the LME is generated by business activities outside the UK, although some of it is routed through British subsidiaries. Further, COMEX traders are perceived to be not as well informed, and there are problems involving the quality of its contracts. The value of the terminal market as a mechanism for producers to manage their risks through hedge selling was emphasized, although it was acknowledged that hedge selling does create greater price volatility.

Brokerage Firms

The role and value of brokers like Rudolph Wolff were considered, as well. Their role was compared to that of stockbrokers in introducing buyers and sellers to the markets. This type of operation allows people other than large producers and customers to have access to markets, thus making prices more representative, it was argued. There are strict limits on open positions at Rudolph Wolff; it will take a position in the market if it is short at the end of the day, but generally not a big position. Noranda, of which Rudolph Wolff is a subsidiary, may take a large position to fix a price forward, then presell

to get cash in order to mine the ore, but this is Noranda's own position, not the broker's. In other words, the broker is not establishing the price, merely acting as an agent between its seller-client and its purchaser-client. The transaction may well result in a change in the price of the commodity involved in the deal.

Asian Markets

The question of how best to serve the growing market for metals in Asia was also considered. It was felt that it should be possible for the LME to serve this market in local time zones, and to be more responsive to that market's needs. Timeliness was viewed as an important way of making the proceeds of manipulative tactics such as hoarding less attractive. Reducing the lag between the time of the transaction and actual delivery would also affect hedging and speculation. The LME plans to open warehouses wherever they would be helpful in net consuming areas; depending on the success of this move, a Japanese Metal Exchange might also make sense.

The Centrally Planned Economies

The presentations by John Tilton and Lorraine Spiess brought insights into the roles to be played by Asian countries in both mineral production and trade, particularly China and the USSR.

The Soviet Union was described as a sleeping giant with huge mineral resources east of the Urals and tremendous potential as both importer and exporter. Traditional markets and sources of eastern Europe will eventually be replaced by markets and sources in Asia, as the resources west of the Urals are nearing depletion and economic activity is increasing in Asia. If the present economic reform efforts are effective, the USSR could become a major exporter of minerals. This will take at least a decade, depending on the level of investment and the rate of development of the necessary infrastructure; they are already experimenting with joint-venture law, for instance. Meaningful reform would also reduce waste, a factor which helps to account for the fact that in the USSR, as in other centrally planned economies, the intensity of use of metals is very high.

The trend in China is toward a market-driven economy. This has major implications for Canada, as it presents a significant marketing opportunity for Canadian producers of nonferrous metals. Lorraine Spiess warned that patience is essential in business dealings in China, and that anyone who undertakes them must be prepared to accept the complexities. A government participant observed that, while most concentrates are sold on long-term

contracts, the Chinese are unwilling to sign framework contracts; Spiess responded that the Chinese do recognize the need for a more orderly approach. Progress will be sporadic for some time yet, but the interest and the will to change are present now, even if the results are slow to appear.

One industry participant expressed considerable reservations about doing business in China. He made the point that, with no central policy controlling trade sources and practices, competition between regions causes severe problems. In addition, mining costs are unpredictable, and customers often find that goods purchased are never delivered.

Without minimizing the difficulties of trading with China, Spiess emphasized the opportunities for market development. She used aluminum as an example of a commodity requirement for the country's developing economy in which self-sufficiency is unlikely. In short, the opportunities exist, and the Chinese central government is taking steps to promote them, but there are no illusions that conducting business in that country is easy.

Trade Associations

It was agreed that some trade associations are productive and others cannot be counted on to contribute effectively. In any case, it is not practical to rely on them for product or market development. Since their major strength is their ability to disseminate existing information, they are most useful as a conduit for sharing information among their members. While it was regarded as dangerous to leave marketing decisions to associations, they are seen as being a valuable resource to metals industries, especially for metals facing the prospect of losing markets to substitution and other competition. Trade associations are doing little in product development but cannot be expected to replace the individual firm's own activities in this area. The firm can focus its efforts much more closely and exploit its proprietary advantage, but by sharing R&D results with other firms through the medium of associations, firms can work more effectively to increase the size of the market. While associations can assist cooperative effort, it takes the individual firm with its own money on the line to actually create the new products and uses that are needed.

An industry participant expressed the view that trade associations must influence the industry by operating with, rather than on behalf of, their members. This requires the cooperation of the industry, however. It is more common for the associations to find out about new products and applications by accident than for their members to volunteer information. An association spokesman gave several examples of situations where associations had been instrumental in resolving difficult problems by facilitating cooperation between different groups, as well as examples of avoidable instances in which lack of

communication had resulted in loss of a large market to another metal or another material.

Some envy was expressed of associations like the Wool Association and the Gold Council. Such groups, whose members are governments and which receive substantial funding, do not have to divert resources into recruiting members, can afford to maintain a high profile by means of very effective institutional advertising. (Institutional advertising refers to promotion of a group of products, whereas product advertising is intended to encourage sales of a particular good or service.)

A representative of an active trade association observed that an association in the minerals industry, with half a dozen major firms all interested in building markets and all contributing roughly equally to its efforts, could produce impressive results. One industry participant agreed that the principle was sound, saying that his firm had taken the trouble to identify the worthwhile associations and to establish productive working relationships with them. The implication clearly is that the associations could be more productive if more firms shared this philosophy.

Market and Product Development

These topics raised by far the most interest among the participants, regardless of their professional orientation. The addresses by Dick Bauer, Larry Morris, Bill Dresher and Hugh Wynne-Edwards were markedly consistent in their descriptions of the sources of the problems in this area, the opportunities, and the possibilities for improvement. As well, they met little argument from other participants, who generally held similar views on the issue.

What It Means

Market development encompasses several basic notions, as set out graphically on page 105: retention of market share by improving existing products, expansion of market share by means of product development, expansion of the market for existing products, and the creation of new markets through innovation to develop new products.

The copper industry was mentioned frequently as an example of a marketing failure by the metals industry over the last twenty years. Copper has lost significant market share, in large part because the industry grew complacent and allowed quality and technology to lapse, in the belief that there was no substitute for copper. Production costs were low and product prices high, making market development seem unnecessary. As a result, the industry left copper's traditional markets vulnerable to advances by other materials.

Nor did it position itself, by research into other uses, to tap alternative markets. These attitudes lost the automotive radiator market, for instance, to the aluminum industry which had worked aggressively to find new markets after World War II.

The metals industry's failure to recognize that "market development is as important to survival as the collection of receivables" (to quote Dick Bauer) is largely a function of inherent characteristics of the industry. Commodity-oriented companies are not attuned to the end-use market; even the vertically integrated firms see themselves primarily as mineral producers and allocate most of their resources to that activity. Exploration is risky and expensive, but it is a risk with which the firms are comfortable; the return on a firm's investment in finding new deposits can be measured and predicted easily and in familiar terms. By contrast, it was argued, the return on an investment in new product development cannot be predicted with any satisfactory degree of accuracy.

These attitudes were attributed by participants to the top management of most firms in the metals industry, who were seen as having a "sales" mentality which has conditioned them to think in terms of selling primary product in as great a quantity as possible, regardless of price. Many of the new applications for familiar materials, applications which would create new markets, are likely to involve small amounts of metals. The returns from such applications will arise mainly from the value added. Such ventures do not have much appeal for people who have spent their working lives evaluating projects on the basis of the volume of metal involved in the transactions. Managers accustomed to expanding sales volume by taking market share from the competition may not be receptive to the notion of investing in expanding the total market unless it includes the prospect of selling substantially more tonnage.

Implications for the Industry

Assuming that the long-term goal of the minerals industry is to sell something to somebody, it is incumbent upon the industry and its individual firms to monitor the market continually, to determine who the customers are and why, and to know what the competition are doing. Much was said about the competition, which could be either other metals or substitutes such as ceramics and plastics. DuPont, for example, mounted a concerted operation to convert the automotive industry to using plastic components instead of metals. Teams of researchers were sent in to work directly with designers and materials specifiers to find applications. Such efforts by the plastics industry educated the customers so that they became very knowledgeable about plastics. The result was the creation of new markets for these products, at the expense of metal producers who did nothing to counteract this campaign.

In response to a government representative's question as to why it would not be preferable to develop ceramics rather than look for new markets for metals, an industry participant replied that, although design people are certainly able to find uses for new materials, customers prefer to use known materials; metals have great potential, and design people can usually find ways to overcome problems. In other words, metals can often match the performance of competing materials; it's simply a matter of taking the trouble to find out how and demonstrating this to the customer. Further, the customer is likely to be receptive, since changing materials may require considerable investment in different manufacturing equipment and skills. This implies a need for the metals producers to move into the Old-Market/Old-Product and Old-Market/New-Product cells of the marketing model by developing and directing resources towards product improvement.

The point was made that the purpose of market development is to create or exploit a competitive advantage. An industry participant observed that, while the marketing activities of individual companies are presently aimed at increasing their own market share, they must also begin to work towards expanding the total market. This means that they should be moving into both the Old-Product/New-Market and New-Product/New-Market cells. One way to accomplish this is through internal product development: i.e. performing in-house R&D to develop new products which will use the materials at hand. Another strategy is to respond to expressed needs by working with the customer's own R&D team, to combine the firm's expertise in the material with the customer's knowledge of the specifications of the application. Each approach has its own adherents and detractors, usually for reasons related to the specific characteristics of the firm, the material, or market factors. These issues are discussed in the following sections.

Internal Product Development

Developing new products through in-house R&D involves the challenge of identifying the end-user and creating the market. Companies using this approach are trying both to develop the technology and to implement it, but mineral companies lack adequate knowledge of the challenges facing their customers. They must also be careful not to enter into competition with their own customers.

The metals industry needs people who can implement technology and new products, but this is difficult to accomplish, for several reasons. Once a product has been developed, it is necessary to find a customer for it, which implies a need to better understand both the intermediate and the end-use market, and to know how to make the product known. Most large metals firms lack this understanding. Since it is unlikely that the aim is to sell a

single product once, a close working relationship with the customer is essential. This means learning about the customer's business, understanding the design process, using his tools, and working on his problems. In some situations, this process can be quite straightforward, but most situations are not simple. The customer may not be on top of his own market, may not even be aware that he has problems. Without familiarity with the market in which the customer operates, the metals firm cannot make good judgements about the extent to which it should become involved in any line of R&D or product development. Profitable product lines require planning, investment and constant vigilance, none of which can be accomplished effectively without a thorough knowledge of the environment, which includes not only one's own industry but also the competition.

Integrated firms are on the right track by attempting to make downstream products that use their primary product, but they usually lack the marketing structure to provide the necessary focus. It was argued that many firms that have tried this strategy used the business equivalent of closing their eyes and pulling the trigger, hoping to hit something worthwhile. Firms must learn to narrow their range of activities to a market niche which is a good fit with the expertise of their employees and their sources of raw material supply. Smaller firms may have an advantage here; for example, they are less likely to spurn a project because the potential market or the material requirement appears to be too small. This reflects the distinction between production- and market-driven companies, with smaller firms less likely to be integrated, and integrated firms much more likely to be oriented to sales of raw materials than finished products. The large integrated companies tend to regard activities other than mining as insignificant, due to the orientation of management towards the "backbone" of their business. The challenge to those marketing managers who would redirect more of their companies' efforts into the development, production and marketing of value-added goods is to educate top management in a new way of thinking, in order to reorient corporate priorities. There was much discussion of this issue, which will be considered further on.

Custom R&D and Implementation

All that has been said about the need for a firm doing its own new product development to be fully informed about its customers and their environment, of course, applies equally to the firm which works with its customers to find the solution to a problem of application. Custom R&D work shares some of the frustrations of developing new products internally. Nevertheless, there are advantages to working directly with the end-user, sharing R&D and technologies, to find a solution to his problem, to implement the solution and to

provide follow-up services. This approach not only keeps the customer focused on the metal firm's product, but also broadens the firm's opportunities to keep informed about developments in other materials.

Even in a large integrated company, it may be a struggle to get sufficient funds to make a meaningful R&D effort. In smaller firms, the resources may not be available for an effective scale of effort. Cooperating with the customer may provide an access to needed R&D equipment and testing facilities. A representative of a firm that specializes in custom product development said that his company looks to its customers for support for special testing and knowledge. He spoke of the need to listen to customers, to become part of their R&D, and be the marketing voice that directs their R&D. This orientation allows his firm to be much more flexible and cost-effective in its R&D activities.

Need for Market Development

The rewards for engaging in the development of new products and new markets are improved profitability and increased market share. Technological advances in materials are creating opportunities for all those on the frontier of innovative applications in both traditional and new products. In addition, the customers themselves are insisting on being involved in the upstream production of the components and materials they purchase. The automobile industry has become a trend-setter in the use of materials and, by maintaining a presence in the work of all its suppliers, has become very knowledgeable. To keep up with the competition, metals companies must maintain a presence of their own, both within their own industry and in the industries they wish to supply.

The contrasting but positive examples of Alcan, a global, integrated company, and Eastern Alloys, a small, private firm specializing in custom work in the zinc industry, provide testimonials to the value of working at the development of new markets and new products. In essence, both companies are doing the same things, and because of these activities, they are both successful. Alcan is discussed in more depth further on.

How to Develop a Market Orientation

Larry Morris's presentation gave an excellent definition of marketing which struck a sympathetic chord, especially with those industry participants who do not enjoy the support of top management in their attempts to shift their companies' focus from "merely sales" to marketing. The "sales mentality" was widely regarded as a major obstacle to improvement in the outlook for the

industry. It is also a source of considerable frustration to market-oriented managers, as they perceive the opportunities to improve their firms' performance, but lack the resources or the independence to take the necessary initiatives. As noted earlier, the type of project that a marketer might see as potentially valuable to the firm is likely to be difficult to justify to his superiors if the result is the creation of a larger market for all producers rather than an immediate dollar payback. For example, getting the resources to pursue such a project may require exaggeration of the potential for tonnage sold, since there seems to be no recognition that small amounts add up to a worthwhile contribution.

This was a common theme throughout the seminar: CEOs understand ore and metal production but not marketing; hence, in the belief that potential markets for new products or new uses for old materials will not result in large tonnage sales, they do not support product and material R&D. One industry participant noted that his firm's investment in product R&D is only one half of one percent of sales, and added that it is a constant struggle to get sufficient funds to make a meaningful R&D effort.

There was general agreement that, in most firms, marketing has no voice in the senior policy-making level of the organization. Marketing needs a champion in senior management, preferably a Vice-President Marketing, since with the title come the "clout" and the opportunity to promote ideas and plans that otherwise would be unheard or rejected out of hand.

Alcan: A Different Approach

An oft-repeated comment was that CEOs, blinkered by the rigidly held belief that primary production is all that matters, need the example of other firms in the industry that have broken from this mould and succeeded because they did so. Alcan is the most obvious of these leaders, and was cited as such by several participants.

As an author of Alcan's successful diversification and product orientation over the past decade, Hugh Wynne-Edwards was seen as an individual who had been able to triumph over the obstacles most marketers still face. In the concluding session, he was pressed for insights as to how Alcan had been induced to diverge from the traditional path. He responded with the observation that resistance to change is greatest at the second and third levels of management. Since the CEO usually belongs to the boards of other companies, he has a breadth of vision lacking in the two levels of management immediately below him. These groups have the maximum investment in the status quo. Their rewards are internal and they are subject to group-think polished by the corporate mentality. As he expressed it, "Pain comes from your peer group; change direction, and you're on someone else's turf." A

government participant observed that second- and third-level managers are concerned with maintaining the rigidity of the system, and that they need outside views to jolt them out of complacency or fear arising from ignorance.

To make any substantive change in the firm's orientation, the CEO must refuse to tolerate resistance just below him. To pointed questions about how this had been handled at Alcan, Wynne-Edwards replied that after 1973, when the market became flat and unstable, Alcan appointed a new CEO, an Alcan career man, who concluded that international marketing was the appropriate tool to redirect the firm into more profitable channels. He made his plans clear and reinforced them by a constant trickle of supportive rhetoric. In 1983, he established Alcan's Technical Strategic Council, composed of himself, his Vice-Presidents and four outsiders. Meeting bi-annually to provide guidance in product development efforts, it acted as a control but also brought a new view of the world into discussions of Alcan's opportunities and actions. In short, the clear and unequivocal support of top management is vital to any effort to establish a marketing function and orientation. The initial impetus for such an effort may have to originate outside the firm in some cases.

Once top management have adopted the principle of market development, it is necessary to raise their "comfort level" with new product projects. They are already comfortable with the risk of exploration, with its long timeframe and low chance of success, so why are they not prepared to gamble elsewhere? What is needed is a project that matches the corporate value set, with which management can "resonate." For Alcan, it was the air-cell battery, a project to develop the potential of aluminum as an efficient fuel for a storage battery. From that step arose a successful strategy of investing in many small projects, simply on speculation, in the hopes that some benefit will develop from discoveries that would not otherwise be made. In contrast, Exxon's R&D program, which focuses on a few major projects rather than the cumulative proceeds of a number of smaller ones, was not successful, and ended in the closure in the 1980s of much of the company's R&D capability.

Wynne-Edwards' final point was that support from one's peers in other firms - one of the benefits of groups like Alcan's Technical Strategic Council - is a key element in establishing and maintaining momentum. He observed that, in most firms, change-makers get expelled and that loneliness is a very real problem for innovative thinkers. Someone working alone to promote an idea that is still being resisted by his colleagues has no one to bolster his courage to attack new things or strike out in new directions. Wynne-Edwards regards failure to act as usually resulting from a failure in courage or focus; thus, it is helpful to have a forum to meet others in the same situation, in order to share experiences and discuss tactics - what he called "a club of guerrillas."

It was agreed that the Centre for Resource Studies could play a role in facilitating such meetings. One industry participant remarked that the current

gathering was an excellent group for supportive discussion of market development; the seminar participants could be open and candid since no competitive advantage was at stake. However, it was also an atypical group, preaching to the already converted. He also maintained that market development does not have to be difficult; a firm can develop its own people, but only if top management gives the strategy its support. Furthermore, second- and third-level managers must be encouraged to champion market development within their firms as well.

Conclusions

In order to progress at this stage in the product cycle of most minerals, in the face of the threat posed by such substitutes as ceramics and plastics, the metals industry can no longer afford to ignore the marketing function. There is an urgent need to add a market orientation to the traditional production-driven direction of most metal producers.

The industry has been doing itself a disservice by concentrating on exploration and extraction, and should diversify more into higher-value-added products. This means spending more on product R&D, both within the firm and by seconding researchers to work with the firm's customers. It means actively searching for new applications and new capabilities for metals, learning more about them and promoting their use, both to increase market share and to expand the total market.

Manufacturers' choice of materials is being affected in this decade by new considerations, notably the environment and recent discoveries in the health field. These are two important areas that neither primary producers nor makers of finished goods or components can afford to ignore. Here, again, undertaking both product and process R&D will be necessary to maintain and expand markets.

These activities cannot be successfully undertaken without the aid of a marketing group which has the full support of top management. This department needs contact with others in similar situations in other firms, to give them a forum for discussion about the problems of being pioneers in a field that so far has few champions, and in some cases may actually induce fear and resistance among second- and third-level managers. More opportunities like this seminar would be welcomed, especially if they included those who have yet to be convinced of the value of product and market development.

Appendix I Program of the Seminar

19th CRS POLICY DISCUSSION SEMINAR
MARKETING POLICY ISSUES IN THE CANADIAN MINERAL INDUSTRIES

November 21, 1988

Session 1: Marketing in the Mineral Industry - the Challenge

7:30 p.m. — *A Customer Perspective*
R.J. Bauer, President, Eastern Alloys Inc.

8:30 p.m. — *Market Effects of Developments in the Nonferrous Mineral Industry in China*
Lorraine Spiess, Executive Director, Canada-China Trade Council

November 22, 1988

8:30 a.m. — *Changes in Mineral Trading Patterns*
John Tilton, Colorado School of Mines

Session 2: Pricing and Contract Negotiation Strategies

9:15 a.m. — General discussion of future challenges

10:30 a.m. — *Pricing Alternatives*
Margaret Slade, University of B.C.

11:15 a.m. — *The Role of Terminal Markets*
Christopher Green, Chairman, The London Metal Exchange

1:15 p.m. — Robin Bahr, Rudolf Wolff and Co. Ltd.

2:00 p.m. — General discussion of pricing and contracts

Session 3: New Marketing Initiatives

3:30 p.m.	*The Role of Trade Associations* William H. Dresher, President, International Copper Research Association Inc.
4:00 p.m.	*Developing Marketing Expertise* William Deeks, President, Noranda Sales Corporation
7:30 p.m.	*Future Market Development Needs* Larry Morris, Director of Market Development, Falconbridge Ltd.
8:30 p.m.	Presentations and general discussion

Session 4: Product and Market Development

8:30 a.m.	*Product Development Challenges* Hugh Wynne-Edwards, Vice-President, Alcan International Limited
9:30 a.m.	General discussion of product and market development
10:30 a.m.	Presentations and concluding discussion
12:00 p.m.	Departure

APPENDIX II SEMINAR PARTICIPANTS

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Hugh Wynne-Edwards, with a doctorate from Queen's University in geological science, has served as head of the Departments of Geological Science at both Queen's and the University of British Columbia. After working with the Minister of State for Science and Technology and as Secretary of University Press, he joined Alcan ten years ago as Chief Scientific Officer and Vice President of Alcan International, the firm's technological arm. In September 1989, Dr. Wynne-Edwards became Science Advisor at Teck Corporation and CEO of Moli Energy Ltd.

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